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ABSTRACT

The Federal Republic of Germany has identified the conservation and the protection of the environment as a major challenge of the 1990s. Environmental education is further identified as an important part of anticipatory environmental policy. The document is separated into two parts. The first part presents the aims, content, and organizational forms of environmental education in the Federal Republic of Germany as described in the nine documents. The documents cover topics involving: the white paper on environmental education; the statement by the Ministers of Education of the Lander in the Federal Republic of Germany on the role of schools in environmental education; the incorporation of environmental matters into the educational system; the recommendation of the Central Committee of the Federal Institute of Vocational Training for Environmental Protection in Vocational Training; a resolution of the European Community Council on Environmental Education; a report by the Federal Republic of Germany on the implementation of the resolution of the Council and the Ministers of Education Meeting within the Council of the European Communities on Environmental Education; the reply by State Secretary Dr. Fritz Schaumann to the question put by Torsten Worfgramm; extracts from the final report submitted by the Study Commission on 'Future Education Policy-Education 2000'; and the statement by Federal Minister of Education and Science, Jurgen W. Mollemann on Environmental Education. The second part contains a summary of pilot schemes and research and development projects on environmental education supported with Federal government money. The projects are presented in six sections involving environmental education as it relates to young people, vocational training, academic training, further education and guidance, the new German Lander, and international organizations. Appendices contain a chronology of environmental education in Germany, and publications on environmental education supported with Federal money. (MDH)

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Environmental Education – a Future-Oriented Task
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Current Situation and Prospects in the Federal Republic of Germany

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Environmental education – a future-oriented task

Current situation and prospects
in the Federal Republic of Germany

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Foreword

In his Statement of Government Policy of 30 January 1991 Federal Chancellor Kohl said among other things: "The major challenges of the 1990s include nature conservation and the protection of the environment." The Federal Ministry of Education and Science has been contributing to this task for quite some time.

In August 1987, the Federal Minister of Education and Science presented to the public a **White Paper on Environmental Education.** Much of this programme has meanwhile been implemented. In this third edition of a relevant documentation 85 projects illustrate the approach chosen by the Federal Minister of Education and Science – pursuant to Article 91 b of the Basic Law – to engage in joint educational planning by the Federal Government and the Länder Governments in the field of environmental education. Numerous **projects in all educational sectors** (kindergarten, school, extracurricular education for young people, vocational training, academic education and further education) were launched. Some of them have been concluded by now. Most of the results will be presented in 1991 or 1992.

Two activities should be highlighted:

– While a Bundestag Study Commission worked on "Preventive Measures to Protect the Earth's Atmosphere", the Federal Minister of Education and Science, at the same time, commissioned an expert opinion to outline the impact of research results on the various sectors of education. A thirty-strong expert commission headed by Professor Dr.h.c. Hellmut Becker, the former Director of the Max Planck Institute for Educational Research in Berlin, succeeded in submitting far-reaching recommendations for more extensive incorporation of environmental topics in all sectors of education. The recommendations are entitled **"Protecting the Earth's Atmosphere – a Challenge for the Educational Sector".** For the first time research and education were linked in such a way that the often time-consuming process of transferring research results to the education system can be shortened considerably. The first response to the experts' report is found in a decision by the Federal Cabinet of 7 November 1990 concerning the reduction of CO_2 emissions in the Federal Republic of Germany until the year 2005. Both the experts' report and the Cabinet decision lament "a lack of skills and knowledge as regards energy conservation options and in particular technologies for using renewable energy sources". Both recommend that "curricula be adapted to accommodate this need and further training be offered for relevant occupations". The Federal Minister of Education and Science has therefore suggested acting on the recommendations and including the subject in virtually all curricula, training directives, study and examination regulations. In addition, pilot schemes could and should develop and test concepts which, if implemented in educational practice, can help make up the numerous deficits in the various sectors of education.

– The Bund-Länder Commission for Educational Planning and Research Promotion (BLK) is currently preparing **general guidelines for environmental education** at the initiative of the Federal Ministry of Education and Science. The first part presents standards for the quality of environmental education in all sectors of education on the basis of available results of research projects and pilot schemes. The second part will present successful practical models, concepts, materials and teaching guides to a broad public and outline the institutional framework for environmental education coordinated at a supraregional level.

Environmental education is an indispensable part of anticipatory environmental policy. This is also the tenor of the Federal Government's 1990 environmental report. Imparting environmental knowledge is one of the central tasks to be accomplished by a review of curricula, training directives, study and examination regulations, and it is a major challenge for education. In the five new German Länder, we are faced with the urgent task of adapting the structure and substance of education in general while at the same time giving environmental education the importance it should have in view of the existing environmental problems.

Professor Dr. Rainer Ortleb
Federal Minister of Education and Science

General Section

The aims, content and organizational forms of environmental education in the Federal Republic of Germany are described above all in the documents which are reproduced below:

I. White Paper on Environmental Education, Federal Minister of Education and Science, August 1987 7

II. Statement by the Ministers of Education of the Länder in the Federal Republic of Germany on the Role of Schools in Environmental Education, 17 October 1980 11

III. List of Criteria of the Priority Area "The Incorporation of Environmental Matters into the Education System" of the Bund-Länder Commission for Educational Planning and Reseach Promotion, 28 April 1987 13

IV. Environmental Protection in Vocational Training – Recommendation of the Central Committee of the Federal Institute of Vocational Training, 4/5 February 1988, as well as Supplementary Recommendation of 30 January/1 February 1991 14

V. Resolution of the EC Council on Environmental Education of 24 May 1988 16

VI. Report by the Federal Republic of Germany of February 1991 on the Implementation of the Resolution of the Council and the Ministers of Education Meeting within the Council of the European Communities on Environmental Education of 24 May 1988 20

VII. Reply of 9 July 1990 by State Secretary Dr. Fritz Schaumann to the Question Put by Torsten Wolfgramm (Member of the German Bundestag for Göttingen) 29

VIII. Extracts from the Final Report Submitted by the Study Commission on "Future Education Policy – Education 2000" (Bundestag Document 11/7820) of 5 September 1990 31

IX. The Future Will Not Wait – Statement to the Press on 24 September 1990 by Federal Minister of Education and Science Jürgen W. Möllemann on Environmental Education 33

I. White Paper on Environmental Education of the Federal Minister of Education and Science

In September 1986 the Federal Minister of Education and Science conducted a symposium on "Environmental Education – A Task for the Future" in collaboration with high-level experts from every area of education (kindergarten, school, vocational education, higher education and further education). The resulting White Paper, published in August 1987, is reproduced here.

"White Paper on Environmental Education of the Federal Minister of Education and Science"

1. The reason for environmental education

In recent years there has been a considerable increase in public awareness of the importance of the environment as an asset worth protecting and of the consequent need to prevent further damage to it.

In many cases, new scientific findings as well as improved methods of analysis in the natural sciences lead to a refined assessment of environmental hazards. Recent research shows that the complex interrelationships between ecological, economic, technical and scientific as well as social factors must always be looked at in terms of their interlocking and mutual effects, in order for us to be able to identify both the causes of environmental damage and environmentally sound behaviour correctly.

2. Aims of environmental education

We can protect our environment only if every one of us takes responsibility. Well-founded knowledge and a change in our behaviour are prerequisites of environmental protection. Environmental protection therefore requires environmental education.

As a part of modern general education, environmental education cannot form a special discipline or a separate school subject. Environmental education must be incorporated into different subjects or offered separately in the form of interdisciplinary courses.

The important task of environmental education can therefore be pursued successfully only with a concerted effort put forth by all those affected and involved. The aim is to create the awareness that everyone is, or can be, both causing problems and be affected by them.

In so doing, we must pay heed to the following points:

– Information about pressures on the environment must be processed in readily comprehensible form;

–the consequences of individual behaviour in and for the environment must be demonstrated by teaching people to observe the environment and their own behaviour;

– understanding of the necessary interaction between ecological, economic, technical and scientific as well as social elements must be promoted, and the significance of different interests and priorities made clear, and this insight must then be translated into pro-environmental action.

3. Measures envisaged by the Federal Minister of Education and Science

The Federal Minister of Education and Science will support efforts to strengthen environmental education within the scope of his competences through pilot schemes and educational research projects.

In September 1986, at the instigation of the Federal Minister of Education and Science, environmental education was adopted as an additional priority area by the Bund-Länder Commission for Educational Planning and Research Promotion.

Within the framework of education research projects it will, among other things, investigate what factors produce changes in behaviour or what practices from abroad could be introduced. Relevant documentation is to be compiled to provide information for educational purposes about the establishment, use and maintenance of biotopes and environmental centres. The Federal Minister of Education and Science considers the following measures in particular to be good policy:

Environmental education for young people

Environmental education for young people must begin in the kindergarten. It is there that the foundation of environmental awareness is laid, which then makes access to environmental education in schools easier.

In 1980 the Länder pointed out that, because of their role in education, schools must make an important contribution towards solving the urgent problem of environmental protection. The Länder Ministers of Education demonstrated in two reports in 1982 and in 1986 that schools were ready to make this contribution. However, practical application of this intention in lessons still needs to be improved, i.a. by:

- developing and testing teaching aids, in cooperation with parents and local facilities, to make children and young people more environmentally aware;
- drawing up a basic framework of environmental knowledge to be taught coherently across school subjects and types of schools;
- developing and testing syllabuses, didactic concepts and materials as well as audio-visual media, information on teaching methods and learning aids;
- making time available in schools for project weeks, field trips, visits to local companies and environmental education days, for information and for the analysis of environmental protection projects, as well as for the concentrated practical application of theoretical environmental knowledge;
- establishing opportunities for cooperating with institutions outside schools, like environmental centres, forestry offices and nature conservation groups, taking into account local conditions, e.g. by involving children and young people in environmental protection campaigns and in competitions for local environmental protection initiatives, and by planting schemes and care for public parks;
- improving the exchange of ideas between schools by creating school societies for environmental education and "eco-centres" serving a number of schools;
- developing and testing action-oriented concepts, organizational models and materials for the training and further training of staff active in environmental education.

In order to win young people over to the cause of environmental protection in all spheres of life, the Federal Minister of Education and Science currently promotes environmental protection in the framework of the national competition "Jugend forscht" ("young reseachers"). Beyond this it is intended to introduce a nationwide environmental competition.

Environmental education in vocational training

Legal provisions for environmental protection already have an impact on a wide range of company-based activities and thus affect initial and further vocational training too. Current national training directives largely accommodate environmental protection. A relevant study has been made. At the instigation of the Federal Minister of Education and Science, representatives of the Federal Government in the Central Committee of the Federal Institute of Vocational Training BIBB will present, for a debate and vote, a recommendation for more extensive incorporation of environmental matters into vocational training. Even though efforts to accommodate environmental protection in vocational training and further training are considerable at present and deserve recognition, this recommendation intends to call upon all those individuals and institutions involved in vocational training to contribute to more effective work-related environmental protection through their work in vocational training. With this in mind, the Federal Institute of Vocational Training is preparing a research project on "Environmental Protection in Vocational Training". In addition, the following measures are necessary:

- developing and testing didactic concepts for training and further training, for activity-based environmental education in vocational training in firms and in schools;
- developing and testing audio-visual media, including teaching and learning aids for environmental eduation in major occupational areas;
- developing and testing training and in-service training opportunities for teachers at vocational schools and training instructors in firms, drawing particularly on the knowledge of the environmental officers in the firms;
- cooperation between local firms and vocational and general schools in imparting environmentally relevant knowledge;
- support for innovatory activities in environmental protection in firms and vocational schools through appropriate pilot projects.

Environmental education in academic education

In higher education, the following measures should be considered:

- incorporation of environment-related courses as a compulsory option into stage II of certain study courses (e.g. law, economics, sociology, education, politics);
- embodiment of environmental education as the theme of a particular interdisciplinary post-graduate study course;
- incorporation of environmental subjects as a didactic principle, that is, as a general educational task of universities in all courses;
- developing and testing an environmental option, parallel to course work, for students of all disciplines at some higher education institutions;
- developing environmentally-specific further education courses with vocational applications;
- talks with organizations of higher education and teachers, the aim being to generally increase awareness of the importance of general environmental education;
- developing and testing other environmental study courses dealing with technical, planning and ecological aspects of environmental protection;
- presentation and evaluation of environmental education opportunities at universities abroad.

Environmental education for adults

In adult or further education, the following matters in particular should be considered:

- developing forms of advertising and guidance appropriate to target groups, in order to address new participants in further education on environmental topics;
- developing courses, forms of learning and materials in order to bring about long-term changes in the behaviour of those responsible and those affected in everyday life: e.g. every citizen, in his/her immediate surroundings, has the opportunity of using environmentally compatible products (e.g. with regard to packaging), or to plant an open space and take responsibility for looking after it;
- close cooperation with regional and local institutions: visits to companies to illustrate the interrelations between economy and ecology; cooperating with the local authority to develop open spaces and residential areas; awareness of and help in eliminating environmental damage caused wilfully or by negligence;
- taking environmental matters into account in courses with closely related subjects, e.g. health and diet, as well as training and further training in environmental questions for the teachers of these courses.

4. Collaboration of the Federal Minister of Education and Science with international organizations

Environmental pollution is a global problem. No country can pursue environmental policy in isolation. Hence the OECD and the EC both concern themselves with environmental education. A number of German schools will be actively involved in an OECD project supported by the Federal Minister of Education and Science and the Länder Schleswig-Holstein, Hesse and Bavaria. The EC named 1987 the European Year of the Environment and the Federal Minister of Education and Science will lend support to establishing environmental education at an international level and learning from the experience of others in environmental education.

II. Statement by the Ministers of Education of the Länder in the Federal Republic of Germany on the Role of Schools in Environmental Education

In the Federal Republic of Germany, responsibility for the content and structure of education, above all in primary and secondary education, rests with the eleven Länder. The basis for individual measures is decided by the Standing Conference of the Ministers of Education of the Länder in the Federal Republic of Germany (Kultusministerkonferenz– KMK). On 17 October 1980 the KMK made the following statement of environmental education:

Our relationship with the environment has become a vital issue, both for the individual and for humanity. It is therefore one of the school's tasks to develop young people's awareness of environmental matters, to promote a willingness to conserve the environment, and to educate young people to behave responsibly in this respect throughout their lives.

This task has become more urgent as environmental pollution has assumed menacing proportions over the past decades. On the basis of their role in educating young people, schools can and must make their contribution towards solving this urgent problem.

By providing an insight into the complex cause-and-effect relationships prevailing in our environment, schools should point out the problems which result from changes in these relationships. Man causes changes in the environment and is, in turn, affected by them. As man-made pollution recoils on man, he is also responsible for the results of his interference with nature. Human action should not be based on short-term gain for those alive today. Out of his responsiblity for future generations man must seek to strike a balance between the appropriation and exploitation of natural resources on the one hand, and the conservation and protection of nature on the other.

The aim should be to develop environmental awareness through insights of this sort. Only by such means will the willingness to use natural resources responsibly and stave off the threats to life's foundations be able to grow. Thus, teaching environmental awareness and environmental protection can promote both understanding and the will to tackle the problems to be solved. In the process it should also become clear to pupils that, with a view to safeguarding human existence, their right to personal development must be reconciled with the public interest.

The aims of environmental education can be pursued by integrating it with the contents of several traditional school subjects or through interdisciplinary courses. In this respect environmental education is an interdisciplinary educational principle which permeates natural science subjects and social science subjects alike.

Within the framework of these aims pupils should in particular:

- learn about citizens' rights and responsibilities as defined by the constitution and the law, and thus become ready to join in the tasks of caring for and protecting the environment;
- be motivated to observe and study their environment in specific ways;
- gain insights into ecological interrelationships and learn about the effects of interfering with them;
- learn about the causes of environmental pollution and of sometimes irreversible environmental changes;
- recognize the interlocking of ecological, economic and social influences which have led to the present state of our environment;
- realize that maintaining the diversity of living creatures and landscapes is necessary for safeguarding the basic prerequisites for life not only for the present generation, but also for future ones;
- realize that environmental pollution is an international problem and a vital issue for the whole of humanity and that concern for the environment thus represents an international task, for which the highly developed, industrialized countries have particular responsibility;

- come to understand that the awareness that we are responsible at the individual and social level is necessary to preserve for mankind the environment that it needs for a healthy and dignified existence;
- realize that caring for the environment includes confronting conflicting interests and that therefore a careful balancing of economic and ecological viewpoints is necessary.

The Ministers and Senators of Education of the Länder agree to take responsibility for the implementation of these principles and aims of teaching environmental awareness and environmental protection and their inclusion in in-service training for teachers.

This decision replaces the decision on nature conservation and animal protection adopted by the Conference of the Ministers of Education on 30 September 1953.

III. List of Criteria of the Priority Area "The Incorporation of Environmental Matters into the Education System" of the Bund-Länder Commission for Educational Planning and Research Promotion

The Federal Minister of Education and Science promotes pilot projects in education through the Bund-Länder Commission for Educational Planning and Research Promotion. The aim of the pilot projects is to develop and test teaching concepts to improve and enhance the education system. Reproduced below is the text of the list of criteria of the priority area "The incorporation of environmental matters into the education system", agreed on 27 April 1987:

"The increasing importance of ecological questions for the continued development of the economy and of society makes it necessary to incorporate environmental matters into the education system, particularly since the pollution of the environment has become so conspicuous in recent years.

The different areas of the education system – kindergartens, schools, vocational education, higher education and further education – must therefore provide insights into the complex interrelations prevailing in our environment and the threats to it. In this way, an attempt is to be made to develop environmental awareness, which should result in the willingness to use natural resources responsibly and – by assuming responsibility also for future generations – to prevent damage to the basic prerequisites of life.

A prerequisite for environmental education in general and environmental education in schools in particular is knowledge about the effects of noise, radiation and chemicals, and about the importance of air, water, soil, animals and plants for life.

Environmental education, including environmental protection and nature conservation, is to contribute to the perception of nature and the landscape in its entirety; in this process, insights are to be taught into the interactions between ecological and economic, individual and societal needs and requirements. Environmental education must lead to realizations and attitudes that enable utilization of the insights gained in environment-conscious conduct and action.

The Länder governments and the Federal Government have launched numerous initiatives to realize these objectives. Within the framework of joint support for pilot projects, the following measures are eligible for funding:

1. Developing and testing material and teaching aids to make children and young people aware of environmental matters.
2. Improving organizational conditions for the setting-up of school gardens, "eco-centres" and similar facilities where pupils can gain practical experience in tackling environmental problems themselves.
3. Developing and testing methods of cooperating with institutions involved with environmental matters; particular attention should be given to regional conditions.
4. Developing and testing environment-related contents and learning aids in suitable occupational areas.
5. Incorporation of practical courses for environmental education into in-service training for teachers.
6. Developing and testing environmental studies options, particularly in connection with other disciplines, in post-graduate studies and in the area of further education courses.
7. Incorporating ecological questions into further education programmes."

IV. Environmental Protection in Vocational Training – Recommendation of the Central Committee of the Federal Institute of Vocational Training, 4/5 February 1988

"1. Issues of environmental protection and ecology are of great importance for the further development of the economy and society. Therefore, all social groups bear special responsibility for these areas.

In accordance with their specific working environment, working people, too, can contribute to effective environmental protection. Vocational education and training is therefore of considerable importance for the protection and improvement of our environment.

2. Building on environment-related instruction in general schools, vocational training and further training must provide insights into the potential impact of occupational work on the environment as well as into the problems arising from changes in the environment. Environmentally relevant contents of vocational training should motivate each individual member of the work force to use natural resources responsibly and avoid hazards to the prerequisites for living out of a sense of responsibility for future generations while bearing in mind the goals of economic growth and technological progress. The inclusion of environmental contents at the same time improves the quality of vocational training.

Environmental skills and knowledge can be taught in firms, inter-firm vocational training institutions and in vocational schools in accordance with the prevailing division of training tasks.

The scope and intensity of such education depend on the relevance of the respective occupation to the environment. Some occupations are environmentally relevant to a particular extent or have been created for the express purpose of environmental protection. However, all occupations are, at least indirectly, important for environmental protection.

In general – also with a view to increasing activity-based learning and learning efficiency – teaching environmental contents should be directly related to the relevant subject contents of the respective training or further training course.

Considerable efforts, which deserve recognition, have already been made in order to incorporate environmental protection into vocational training and further training. Occupation-related environmental contents and examination requirements have been included in the training and further training standards adopted in recent years; in the case of some occupations which are particularly relevant to the environment, standards have included environmental topics since the early 1970s. In 1984 the first environmental protection qualification, the "technician in supply and waste management", was introduced, and in 1987 a Federal Government ordinance was passed governing further training for the advanced qualification of "Master in supply and waste management". A special priority of the reorganization of scientific and technical occupations in 1986 was the incorporation of environmental training contents and examination requirements.

Firms increasingly offer their trainees an introduction to in-firm environmental protection. Many inter-firm training institutions, above all in the agricultural area and in the craft trades, offer environmental qualifications.

Under a new promotion priority of the Bund-Länder Commission for Educational Planning and Research Promotion, measures are being developed and tested to encourage the broader inclusion of environmental topics in instruction at vocational schools.

Further efforts are required in all fields of vocational training and at all places of learning.

3. Therefore the Central Committee recommends the following:

– inclusion of occupation-related environmental training contents and examination requirements in new training and further training directives as well as in those relevant directives which require revision;

– preparation of environmentally relevant material for vocational training (media and practical aids, teaching and learning material);

– further training for vocational training staff in companies and in inter-firm training institutions as well as in-service training for vocational school teachers;

– intensification of research on the role of environmental protection in vocational training;

– cooperation between local firms on the one hand and general and vocational schools on the other concerning the teaching of environmental contents.

All those involved in vocational education and training are requested to use their best efforts to contribute to more efficient occupation-related environmental protection through vocational training."

Supplementary recommendation of 30 January/1 February 1991

"1. With a view to making vocational training reflect more strongly the requirements of environmental protection, relevant issues should be included in the development of recognized training directives for specific occupations.

Therefore the importance of occupational work for environmental protection should be explained as a new and separate item

"7. Environmental protection" in the application filed with the competent government department. In addition, the list of relevant occupational knowledge and skills must be supplemented by a list of environmental skills to be imparted in an integrated approach.

2. The Federal Government is requested to take all necessary steps to implement this decision."

V. Resolution of the EC Council on Environmental Education

During the European Year of the Environment in 1987 all EC Member States promoted measures to foster awareness, provide information and induce citizens to change their behaviour. Thus the European Year of the Environment was an environmental education measure in itself. Under the German presidency, the EC Council of Ministers adopted a resolution on environmental education on 24 May 1988. The text of the resolution is reproduced below:

Resolution of the Council and the Ministers of Education meeting within the Council on Environmental Education of 24 May 1988
(88/C 177/03)

THE COUNCIL AND THE MINISTERS OF EDUCATION MEETING WITHIN THE COUNCIL,
AWARE of the increasing need to protect the environment so as to improve living conditions and ensure the harmonious development of economic activities throughout the Community;

REAFFIRM their determination to strengthen, in accordance with the European Community environmental action programmes of 1973, 1977, 1983 and 1987, public awareness of problems relating to the conservation and improvement of the environment by means of appropriate action in the education sphere;

RECALL that in accordance with Article 13OR (2) of the Treaty establishing the European Economic Community, requirements relating to the protection of the environment shall be a component of the other policies of the Community and that, in accordance with paragraph 4 and taking into account the factors set out in paragraph 3 of the same Article, the Community shall take action in this field to the extent to which the common objectives can be obtained better at Community level than at the level of the individual Member States;

BELIEVE that, as stated in the resolution of the Council of the European Communities of 19 October 1987 concerning the continuation and implementation of a European Community policy and action programme on the environment (1987 to 1992), it is important, whilst observing the respective competences of the Community and the Member States to concentrate Community action on certain priority fields, amongst which is the promotion of education and training in environmental matters at the appropriate levels;

RECOMMEND that measures be taken, in accordance with the resolution of the Council and the Ministers of Education meeting within the Council of 9 February 1976, comprising an action programme in the field of education, with a view to promoting closer relations between systems of education for the purpose of furthering environmental education;

CONSIDER that all sectors of education (pre-school, general and vocational, higher and further education) should make a contribution to carrying out the task of environmental education;

NOTE the growing demand for staff with specialized knowledge of environmental protection matters and the consequent need to intensify and improve action in the sphere of education, vocational training and advanced education, to respond to this demand;

AGREE to establish certain principles concerning environmental education so as to promote the full development of such education throughout the Community;

Point out, bearing in mind action already taken under Community environmental programmes to set up schools' networks as well as action by international organizations such as the Organization for Economic Cooperation and Development (OECD) and the United Nations Educational, Scientific and Cultural Organization (UNESCO), that concepts of environmental education and measures for their implementation are being developed in all Member States and that it appears appropriate to establish a systematic exchange of information and experience in the Community;

AGREE on the need to take concrete steps for the promotion of environmental education, so that this can be intensified in a comprehensive way throughout the Community;

HEREBY ADOPT THIS RESOLUTION:

I. OBJECTIVE AND GUIDING PRINCIPLES

The objective of environmental education is to increase the public awareness of the problems in this field, as well as possible solutions, and to lay the foundations for a fully informed and active participation of the individual in the protection of the environment and the prudent and rational use of natural resources. For the achievement of this objective environmental education should take into account particularly the following guiding principles:

– the environment as the common heritage of mankind,

– the common duty of maintaining, protecting and improving the quality of the environment, as a contribution to the protection of human health and the safeguarding of the ecological balance,

– the need for a prudent and rational utilization of natural resources,

– the way in which each individual can, by his own behaviour, particularly as a consumer, contribute to the protection of the environment.

II. MEASURES

The achievement of this objective and implementation of the guiding principles should be promoted both at the level of the Member States and at European Community level.

A. Action to be taken at Member State level

Within the limits of their own specific educational policies and structures, the Member States will make every effort to implement the following measures:

(a) each Member State, taking account of regional particularities and in cooperation with parents, local bodies and other relevant bodies, should promote the introduction of environmental education in all sectors of education including vocational training and adult education. It would appear appropriate that its current policy on environmental education should be set out in a document and made available to schools and other educational institutions.
The document should take account of the fact that environmental education is an interdisciplinary subject of relevance to many fields of teaching:

(b) for the carrying out of these tasks, it would appear important for the relevant authorities of the Member States:
– to give consideration to the basic aims of environmental education when drawing up curricula and organizing interdisciplinary courses,

– to encourage extracurricular school activities by means of which theoretical knowledge of the environment acquired in school can be put into practice,

– to take appropriate measures to develop teachers' knowledge of environmental matters in the context of their initial and in-service training,

– to undertake specific action to provide teachers and pupils with appropriate teaching materials.

It would appear appropriate to prepare, implement and improve these priority activities with the help of pilot and research projects;

(c) specialists who are particularly concerned with environmental problems should, through appropriate vocational training facilities, have the opportunity to acquire new knowledge or bring their knowledge in this field up to date. Relevant environmental content should also be introduced into initial vocational training and university training, with a view to influencing those with future professional responsibilities in a direction which is most favourable to the conservation of the environment and natural resources.

B. Action to be taken at Community level

In order to reinforce the action of the Member States and achieve effective collaboration in this field, the Commission, assisted by a working party of representatives of Member States, appointed by the Commission on the proposal of the Member States concerned, is invited to take the following initiatives:

(a) Exchange of information

– production of an inventory of initiatives taken in the Member States and at Community level with a view to facilitating their transposition and systematic comparison,

– organization of meetings, seminars and symposia about aims and methods of environmental education, as well as for examining the specifically European aspects;

(b) Improvement of the documentation for teachers and pupils

– measures to place basic documentation on various Community issues in the environment sphere, as well as results of Community research programmes, at the disposal of teachers and pupils,

– organization of summer courses at European institutes of higher education for teaching specialists so as to enable them to exchange experience and identify new methods of teaching in the environment sphere,

– production of a European guide to institutes of higher education offering courses in disciplines concerned with environmental problems;

(c) Incorporation of environmental education into current activities

– encouragement for initiatives by young people for young people or partnerships in the environment sphere based on the existing Community ad hoc arrangements,

– promotion of meetings between young Europeans on topics of environmental protection through the "Youth for Europe scheme" (Yes) and the "Exchanges between young workers" scheme,

– insertion of the topic "Environmental education" into the "Study visits for education specialists" (Arion) programme so as to enable a certain number of national, regional or local specialists in environment education to visit another Member State in order to exchange information and improve their work through incorporation of a European dimension,

– encouragement for cooperation between institutes of higher education operating in the environment sphere by using the opportunities offered by the Erasmus programme to promote the mobility of students and European teaching staff and the development of common teaching materials,

– encouragement, in the environment sphere, for cooperation between institutes of higher education and industry as regards training in new technologies by using the Comett programme.

III.

The Education Committee shall monitor implementation of the resolution in liaision with the working party on the environment.

IV.

The Council and the Ministers of Education meeting within the Council invite the Education Committee to make an initial report to them within a period of two years following the adoption of this resolution in the progress of action undertaken in the field of environmental education at Member State and Community level.

V.

The decision relating to the financing by the Community of the action referred to under II.B shall be taken in accordance with the rules and procedures of the Community.

VI. Report by the Federal Republic of Germany of February 1991 on the Implementation of the Resolution of the Council and Ministers *of Education Meeting within the Council of the European Communities* on Environmental Education of 24 May 1988

1. The Federal Republic of Germany is a federal state. The education sector is governed by the provisions stipulated in the German constitution, the Basic Law. In accordance with Germany's federal structure, the legislative and administrative competences are divided between the Federation (Bund) and the constituent states (Länder). This division of competences is characteristic of a federally structured state. The greater part of legislative and administrative tasks in the field of education and science, in particular with regard to schools, higher education and cultural affairs, lies within the competence of the Länder. These Länder competences, which are often described by the term "Kulturhoheit" meaning independence of the Länder in cultural and educational matters, are the core of independent Länder policy.

   At the same time, the Federation, too, has substantial competences in the field of education, science and culture, above all as regards vocational training outside school, the general principles governing higher education, foreign cultural policy and, together with the Länder, the promotion of academic research.

   Pursuant to the Basic Law, the Federation cooperates in the fulfilment of certain tasks of the Länder, if these tasks are of public importance and federal action is required for improving living conditions. In the field of education, this includes in particular the joint task of constructing new higher education institutions and expanding existing ones. In addition, the Federal Government and the Länder governments cooperate in educational planning and in the promotion of academic research institutions and projects of supraregional importance; examples are the German Research Association (Deutsche Forschungsgemeinschaft) and the Max Planck Society with its institutes.

   Since 1948 the Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany (KMK) has been an instrument of voluntary educational cooperation and coordination among the Länder. In this body the Länder try to coordinate schooling and higher education as regards structures, institutions, study contents, and examinations. Agreements between the Länder have provided for the unification of basic educational structures in the Länder such as the duration of compulsory schooling, the beginning and end of the school year, the duration of school holidays, the names of the different educational institutions and their organizational forms, the essential elements of curricula and the terms to be used to assess student performance.

   In 1970, the Federal Government (Bund) and the Länder governments concluded an administrative agreement establishing the Bund/Länder Commission for Educational Planning (BLK). In 1975, the Commission was given additional functions by the Skeleton Agreement on Research Promotion. The BLK is the permanent forum for the discussion of all education and research promotion issues in which the Federation and the Länder have a common interest. In the field of educational planning, the Commission's work focusses on major topical issues which are of prime importance from the national viewpoint.

2. The aim of environmental education is to enable students to better understand their own living conditions. In particular, they should be taught that, in view of our responsibility vis-à-vis future generations, it is necessary to strike a balance between the appropriation and use of natural resources on the one hand and the conservation and protection of our natural basis for living.

   Specific environmental knowledge is not sufficient. Successful environmental education rather aims to change the political and economic behaviour of individuals and societies. It therefore includes not only the natural and social sciences but also socio-economic, ethical and religious aspects as well as nature orientation through experience. The resulting values are considered a prerequisite for a sense of responsibility – based on a general understanding – vis-à-vis oneself, the community and nature.

Environmental education is to enable students to assume responsibility for safeguarding the natural basis of living through their own behaviour as well as through participation in societal, economic and political life. Consequently, environmental education is governed by the following teaching and learning principles that are complementary and pervade each other:

- Environmental education involves the students' perception of their individual experiences and the identification of the knowledge and skills they have previously acquired in a real-life context.
- Environmental education as a holistic hands-on approach to vital environmental processes meets the interests and capabilities of students.
- Environmental education will have to deal above all with problems significantly interfering with nature and society and teaches students the awareness that they can shape their present and future environment.
- Environmental education is based on scientific findings and methods assisting students in identifying the complex relations in real life and dealing adequately with relevant problems from the point of view of the respective discipline, occupation or role.
- Environmental education is an integral part of preventive and anticipatory environmental policy; it is an instrument for the transfer of environmental research results to practical environmental protection and for encouraging environmentally acceptable behaviour at work, in the home and during leisure time.

Promotion of environmental education is based on the following documents:

- the decision on the "environment and school education" taken on 17 October 1980 by the Conference of Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany (KMK) as well as the KMK reports on "environmental education in schools" of 25 May 1982 and 12 December 1986,
- the list of criteria of the priority area "The incorporation of environmental matters into the education system" established by the Bund-Länder Commission for Educational Planning and Research Promotion on 28 April 1987,
- the White Paper on Environmental Education issued by the Federal Ministry of Education and Science in August 1987,
- the decision taken by the Central Committee of the Federal Institute of Vocational Training on 4/5 February 1988 and the supplementary recommendation of 30 January/1 February 1991,
- the resolution of the Council and the Ministers of Education Meeting within the Council of the EC of 24 May 1988.

3. In its decision on the "environment and school education" of 17 October 1980 the KMK agreed principles and goals relating to education designed to enhance environmental awareness and environmental protection for general application throughout the Länder of the Federal Republic of Germany. The KMK stresses that, in view of the increasing hazards to our natural basis for living, it is a task for schools to instil in young people an awareness of environmental questions, to promote a willingness to adopt a responsible attitude towards the environment that will continue throughout life.

   The KMK states in its decision that the aims of environmental education can be pursued by integrating it with the contents of several traditional school subjects or by offering separate cross-curricular courses. It has thus made it clear that environmental education is an interdisciplinary educational principle which permeates natural science education and social science education alike.

   In 1982, the Conference of Ministers of Education first reported on the implementation of this decision in school education and teacher training in all Länder; the report was updated and supplemented in 1986. It revealed that environmental issues play an increasingly important part in the syllabuses of school subjects and learning areas. Many teachers devote their class work to the solution of environmental problems. This makes pupils more sensitive to environmental issues and increases awareness of their responsibility for their own living environment. Another update on the

KMK report, which includes the development of environmental education in the schools of the five new German Länder, is planned for 1991.

On 18 May 1989 the German Sports Federation (Deutscher Sportbund, DSB) and the Sports Commission of the Conference of Ministers of Education adopted a joint statement on the subject of "sport and environmental education".

In all Länder of the Federal Republic of Germany environmental education is considered to be part of the school's general education mission. Special guidelines and publications on environmental education issued by the educational administrations mention the basic skills to be acquired by pupils and often – like the syllabuses of environment-related subjects – also include didactic advice and classroom examples.

Environmental education is thus firmly established at all levels and types of schools, either in certain subjects or, occasionally, also in interdisciplinary courses. At numerous schools, classroom teaching of environmental issues is supplemented by the cooperation of experts from non-school environments as well as by – usually project-related – extracurricular events.

Environmental problems as part of school instruction are incorporated into the subject-related and didactic training of teachers. As a result, environmental education is being progressively included in the regulations governing the examination of teaching candidates. In addition it is becoming increasingly important in the range of didactic in-service training programmes for subject teachers.

Almost all Länder are carrying out school projects and pilot schemes on environmental education. Numerous pilot schemes are funded on a 50:50 basis by the Federal Ministry of Education and Science and by the Länder governments via the Bund-Länder Commission for Educational Planning and Research Promotion (BLK). The aim of these school projects and pilot schemes on environmental education is to develop and test special didactic concepts which enable the increasing incorporation of environmental issues into general education (involving e.g. cooperation between school and non-school institutions, pupil-centred teaching models, interdisciplinary courses/project work, relevant refresher courses for teachers).

Among the pilot schemes funded jointly by the Federal Government and the Länder governments are the following

– family – health – environment (Baden-Württemberg),

– environmental education at primary and secondary general schools in rural areas (Bavaria),

– environmental education and ecological design of the school environment (Berlin),

– practice-oriented studies on ecological issues with a view to their inclusion in the curricula of secondary level II at vocational and grammar schools (Bremen),

– environmental education at school country hostels (Hamburg),

– extra-mural projects as a contribution to environmental education in biology classes at all school types and levels (Hesse),

– cooperation between schools and an environmental centre run by a nature protection society (Lower Saxony),

– practice-related environmental education in schools by means of cooperation partnerships with non-school institutions (Rhineland-Palatinate),

– integrated environmental education in schools including the establishment of a central environmental education office (Saarland),

– health promotion in everyday schooling – measures for a healthy lifestyle (Schleswig-Holstein).

In the field of environmental education for children and young people the Federal Ministry of Education and Science and the Ministry of Social Affairs of Land North Rhine-Westphalia are promoting an additional pilot scheme on "Environmental education in the kindergarten".

Material for environmental education in general schools is abundant. This material includes the information brochures of various associations and organizations, teaching guides prepared by Länder institutes responsible for curricular planning, and audio-visual material provided by the Institute for Film and Image in Science and Education (Institut für Film und Bild in Wissenschaft und Unterricht, FWU) to accompany the supply of teaching and learning aids.

4. The demand that environmental learning be incorporated into vocational training is based on the impact of occupational activities on the environment. Today every occupation is related directly or indirectly to environmental protection or, in other words, every occupational activity involves potential hazards to the environment. Responsible and environment-conscious occupational work therefore requires occupational qualifications, a basic knowledge of the technical, chemical, biological and ecological interrelations as well as the willingness to change one's behaviour. Since all occupations are related to environmental protection, it is obvious that existing occupational structures should be taken as a basis for vocational environmental education. The explicit incorporation of specific goals of learning into training directives is the first step on the way to including the teaching of occupation-specific environmental knowledge and skills in vocational training. Environmental contents are taught in an integrated approach, i.e. they are related to occupation-specific training contents and the students' future functions.

   Vocational education and training in the dual system (which includes both work in the company and instruction at part-time vocational school) offers particular opportunities for encouraging environmental insights and appropriate behaviour while confronting trainees with possible fields of conflict. The chief approach is via regulatory instruments – training directives for on-the-job training and framework curricula for vocational education at school. In its recommendation on the inclusion of environmental protection issues in vocational training of 4/5 February 1988, the Central Committee of the Federal Institute of Vocational Training therefore suggested as an important measure the "inclusion of occupation-related environmental training contents and examination requirements in new training and further-training directives as well as in those relevant directives which require revision". Training directives are Federal Government ordinances based on the provisions of the Vocational Training Act. They stipulate the minimum requirements for in-firm training. Framework curricula are recommendations issued by the Conference of Länder Ministers of Education for part-time vocational school instruction to be implemented in the individual Länder.

   Since 1984 environmental protection has been included in occupational profiles as a standard item such as "industrial safety, accident prevention, environmental protection and energy conservation." Relevant goals of learning have been formulated. In addition, the provisions of individual training directives integrate subject-oriented goals of learning with action-oriented provisions, thereby indicating the environmental importance of certain training contents. Pursuant to the more recent training directives, environmental protection is a mandatory part of intermediate and final examinations, if the environmental relevance of an occupation so requires.

   The framework curricula for instruction at part-time vocational schools mention environmental protection in various connections. Most frequently the general goals of learning are worded as follows: "The trainee should be able

   – to describe the environmental impact of his/her work and to suggest measures for avoiding or reducing it

   – to describe the basic principles and measures for efficient energy utilization at work."

   With a view to encouraging environmental education in the framework of vocational training the Federal Minister of Education and Science cooperates with firms in industrial pilot schemes and, via the Bund-Länder Commission for Educational Planning and Research Promotion, carries out pilot schemes together with the Länder. Some examples are listed in the following:

   – school for technical environmental protection; certified technician, mechanical engineering/process and environmental technology (Baden-Württemberg);

– environmental education – a task for part-time vocational school (Bavaria);

– training materials for ecological construction in the field of building conservation (Bremen);

– development and testing of ecologically oriented training programmes for the food trade (Bremen);

– environmental advisers in the craft trades (Hamburg);

– environmental protection in part-time vocational schooling for construction-related occupations (Lower Saxony)

– development of an environmental protection qualification concept for small and medium-sized enterprises in the retail trade (North-Rhine Westphalia);

The training of instructors is a particular priority for promotion:

– modules for non-subject-related qualification of instructors and trainees in the chemical industry focussing on ecology and social skills (Berlin);

– qualification of vocational training personnel for environmental education (Lower Saxony).

5. The fourth edition of the "Guide to environmental studies" (Studienführer Umweltschutz) published in 1988 by the Federal Environmental Protection Agency (UBA, Berlin) shows that environmental studies at universities and Fachhochschulen have become increasingly important in recent years. The third edition of 1982 of the guide listed 29 universities with 50 study courses and 12 post-graduate courses, whereas the 1988 edition mentions 46 universities with 97 study courses and 18 post-graduate courses involving issues of environmental protection. The following study courses have been added:

– energy and process technology
– physics
– psychology
– surveying.

The environment-oriented study courses already offered in 1982 show an increase in particular in the following subjects:

– agricultural science
– civil engineering
– biology
– geography
– geology
– law
– economics.

Post-graduate or further education courses were newly established in the following disciplines:

– civil engineering/water resources management
– energy technology
– forestry
– use of renewable energy sources
– ecology/environmental protection
– safety engineering
– environmental advising
– environmental technology
– environmental education/nature conservation management.

Two universities now offer self-contained environmental study courses: Since the 1975/76 winter semester the Berlin Technical University has been offering a study course on environmental protection in engineering leading to the degree of engineer for environmental protection. Braunschweig Technical University started offering a second study course following adoption of the examination regulations for the diploma study course "Geoecology" on 13 March 1990.

The 1982 Guide to environmental studies listed 32 Fachhochschulen with 40 study courses and 3 post-graduate courses giving special attention to ecological problems. In the 1988 edition the list already includes 51 Fachhochschulen with 73 study courses. In 1990 the existing advanced study courses were supplemented by a post-graduate course on energy management.

The following study courses giving particular attention to environmental aspects are listed for the first time in the latest edition of the Guide to environmental studies:

- apparatus engineering
- architecture
- building physics
- biotechnology
- chemical engineering
- chemical technology
- nutrition and domestic science
- social work/out-of-school education
- economics/business administration.

As regards the courses listed in the 1982 edition of the Guide, environmental studies on offer have been supplemented by courses offered by additional Fachhochschulen in the disciplines

- civil engineering
- mechanical engineering
- process technology
- supply technology.

The study course "health technology/environmental and sanitary technology", which is offered by 6 Fachhochschulen, was added in 1990.
The Fachhochschule Rheinland-Pfalz at Bingen has remained the only institution of its kind offering a self-contained environmental protection study course (for 15 years now).

Particular deficits are apparent in the fields of environmental law, environmental economics and management. In teacher training, environmental education also plays only a minor role.

Among the pilot schemes funded jointly by the Federal and the Länder governments are the following in particular:

- Environmental education and environmental advising. Refresher course for environmental teachers as well as environmental educationalists (Hamburg)
- Technical development, transfer and further training in the field of environmental protection and water management involving cooperation among higher education institutions, chambers of handicrafts and industry (Hamburg)
- Development and interlinking of study and further education programmes in the fields of energy management and local environmental planning (Hesse)
- Basic knowledge of the utilization of renewable energy sources (Lower Saxony)
- Further education study courses on environmental advising (North-Rhine Westphalia)

The above-mentioned projects focus on the development and testing of two– to four-semester post-graduate study courses as well as further education courses for the working population.

6. In addition to further training under the projects mentioned above, continuing education plays an important role in the teaching of environmental awareness and in encouraging environmentally compatible behaviour among large sections of the population. All 900 adult education centres in the Western part of the Federal Republic of Germany (including West Berlin) now offer ecology programmes dealing above all with real-life problems (nutrition, energy, homemaking). Furthermore, environmental education is increasingly supported by environmental centres, which provide extensive assistence: they offer further training courses, carry out projects, organize excursions, provide documentation and information, enable participants to experience nature, serve as extra-mural places of learning for school classes and as cooperation partners in numerous extracurricular programmes for young people and continuing education offerings.

   The demand for continuing and further education continues to increase. Nevertheless, attracting new groups of participants who have not yet been in touch with environmental issues is difficult. For that purpose, several further education projects have been launched, some of them with Federal Ministry of Education funds, while others have been financed jointly by the Federal and Länder Governments. The following are a few examples:

   – Behaviour modification by further education (Katholische Bundesarbeitsgemeinschaft für Erwachsenenbildung)

   – Retraining of unemployed teachers to become ecology assistants (Wirtschaftsakademie für Lehrer e.V., Bad Harzburg)

   – Integration of environmental topics into adult education programmes (Deutscher Volkshochschulverband)

   – Home-related environmental advising – skilling courses for women homemakers (Deutscher Hausfrauenbund e.V.)

   – Ecological education in sports (Deutsche Sportjugend)

   – Development and testing of a mobile environmental education facility (Bund Naturschutz in Bayern e.V.)

   – Activity-based environmental learning in clubs/associations – establishment of a regional ecological learning centre in a residential adult education centre (North Rhine-Westphalia)

   – Ecology and ecotechnology in extracurricular education for young people – learning initiative "Women design ecotechnology" – a further education model for women organizers of girls' group activities (Berlin)

   – Environmental manual as a tool of environmental education (Deutscher Forschungsdienst der Stiftung Öffentlichkeitsarbeit für die Wissenschaft e.V.)

7. Special efforts – througout the education system – are needed in the next few years with regard to the establishment and extension of environmental education in the five new German Länder. In the former GDR environmental education was designed by the "advisory board for environmental protection" at the GDR's Council of Ministers, which implemented the recommendation issued by the 1988 UNESCO Conference on Environmental Education.

   Hardly any documents are available on practical implementation. All that can be said is that the one-hour school garden instruction at the lower level of "polytechnic" general school (grades 1 to 4) and work in the "young tourists facility" and "young scientists and technicians facility" in the framework of extracurricular education seem to have been of prime importance in general environmental education.

   However, it is hardly possible at this stage to say to what extent the contradictions between environmental theory in education on the one hand and real life on the other hand – resulting from the critical environmental situation in the new German Länder – could be considered and handled.

   Following the 1989 events, the Ministry of Education and Science prepared several concepts for education at general schools and for hazard protection in higher education institutions; some of these concepts were very detailed but none of them has produced any effects so far. This is first and foremost due to the fact that at present the competent Länder authorities' main task is to transform the formerly centrally administered schools and higher education institutions into

Länder institutions. It cannot yet be said which contents and forms of organization will be retained, abandoned or replaced.

8. Since 1987 the Federal Minister of Education and Science has launched more than 80 pilot schemes as well as research and further education projects – partly in cooperation with the Länder via the Bund-Länder Commission for Educational Planning and Research Promotion – in the various sectors of education (kindergarten, school, vocational training, higher education and further education). Some of these projects have already been concluded. The results of most of them will be presented in 1991 and 1992.

   Departmental research projects of the Federal Ministry of Education and Science deal with general issues. If Länder competence is involved, these projects are coordinated with the Länder and some of them are financed and carried out jointly. At present, the following projects are of particular importance:

   – evaluation of the practice of environmental education in the Federal Republic of Germany (including the new German Länder)

   – design of instruments for periodical and continuous information on environmental education for selected target groups

   – environmental education in conurbations

   – environmental protection in vocational training – an international comparison (in cooperation with ILO, Geneva).

   Issues involved in the incorporation of the results of pilot schemes into classroom teaching, into curricula and into the organization of environmental education are discussed at meetings of experts of the Federal Ministry of Education and Science and the Länder involving the participation of the German Association for Environmental Education (Deutsche Gesellschaft für Umwelterziehung DGU) and the Institute for Science Education at Kiel University (IPN).

9. What is of essential importance in environmental education is the transfer of environmental research results into practical environmental protection. Environmental education is the vehicle for such a transfer. Accompanying the work of the Bundestag Study Commission "Preventive Measures to Protect the Earth's Atmosphere" the Federal Minister of Education and Science therefore commissioned a thirty-strong expert commission to draw up recommendations for the implementation of the study commission's results in education. A detailed report has been submitted. For the first time efforts have been successful to develop a concept for linking research and education which is likely to shorten considerably the often time-consuming process of transferring research results into the education system. The Federal Cabinet's decision of 7 November 1990 on the subject of CO2 reduction includes some results of the report in a separate chapter on information, guidance, training and further training. The decision calls for a closing of "gaps" meaning "the lack of knowledge and skills regarding the energy conservation potential of renewable sources of energy and in particular the technologies for using them" by means of "curricula adaptation as well as the provision of further training courses for relevant occupations, in particular for architects, engineers, technicians and craftsmen". The Federal Minister of Education and Science aims to cooperate with the Länder governments as well as employers and trade unions in the implementation of the recommendations.

   In the final analysis, the further development of environmental education requires measures relating to the following fields:

   – didactic concept: development of activity-based teaching and learning and promotion of interdisciplinary approaches;

   – general framework for environmental education: coordination of environment-related subject teaching, allowing time for project weeks and environmental events, discussion of environmental topics and a trade-off between ecology and economics;

- training and in-service training for teachers: methods training including interdisciplinary approaches, awareness of the need for cooperation with ecological institutions (environmental associations and environmental agencies)
- cooperation with institutions involved in environmental protection and environmental research: exploiting the information potential and expertise available in environmental protection and research institutions, linking institutional and non-institutional environmental education in the region.

In addition, the Federal Ministry of Education and Science has submitted a draft concept for environmental education to the Bund-Länder Commission for Educational Planning and Research Promotion. This overall concept contains standards for quality environmental education in all sectors of education, which are based on an analysis of the results yielded by pilot schemes and research projects. Besides the implementation of the recommendations of the commission of experts on "Preventive Measures to Protect the Earth's Atmosphere", fine-tuning this concept is one of the most urgent national tasks in the promotion of environmental education. The project group on "Innovation in education" of the Bund-Länder Commission for Educational Planning and Research Promotion is discussing the details of this concept, which is to provide orientation for the further development and implementation of environmental education in the 1990s.

10. Given the above-described situation, activities and developments, the Federal Republic of Germany considers that is has fully accomplished its tasks as a Member State as stipulated in the Resolution on environmental education adopted by the Council and the Ministers of Education meeting within the Council on 24 May 1988.

VII. Reply of 9 July 1990 by State Secretary Dr. Fritz Schaumann to the Question Put by Mr. Torsten Wolfgramm (Member of the German Bundestag for Göttingen)

In the opinion of the Federal Government do curricula at schools and other educational institutions provide sufficient time for instruction on the environment (including in particular a basic knowledge of biology) and, if not, what possibilities does the Federal Government envisage for improving the situation?

"The Federal Government considers that, in view of the dimension of the problems raised by the environment, the contents and scope of environmental education as currently provided at all levels of the education system require further improvement."

To this end, the Federal Minister of Education and Science is contributing within the framework of his competence by numerous measures introduced on the basis of the August 1987 "White Paper on Environmental Education of the Federal Minister of Education and Science". The measures include the following:

1. Establishment of environmental education as a funding priority of the Bund-Länder Commission for Educational Planning and Research Promotion (1987) and promotion of approximately 20 ongoing pilot schemes at kindergartens and schools, firms, higher education institutions and further education institutions; coordination, evaluation and dissemination of the results.

2. Incorporation of the draft for an overall environmental education concept in the deliberations of the Bund-Länder Commission for Educational Planning and Research Promotion; this concept is parallel to the concepts developed for education in the creative arts and in computer science; orientation to all ecological spheres of influences (ranging from the atmosphere to food) and to all fields of application (from the home to tourism).

3. Promotion of research projects and meetings of experts within the framework of interdepartmental research. With regard to the approximately 20 ongoing projects, the recommendation presented in August 1990 on the application throughout the entire education system (school, vocational training, higher education, further education) of the proposals of the Bundestag Study Commission on "Preventive Measures to Protect the Earth's Atmosphere" is particularly important.

4. Updating of training directives for vocational training on the basis of a decision taken in February 1988 by the Central Committee of the Federal Institute of Vocational Training.

5. Organization of a competition for pupils concerning practical involvement in environmental problems; the Institut für die Pädagogik der Naturwissenschaften (Institute for Science Education) in Kiel has successfully completed a preliminary phase in this connection.

6. Promotion of projects relating to the environment in the framework of the higher education framework plan (Article 91a of the Basic Law, University Construction Act).

7. Publications issued by the Federal Ministry of Education and Science including:

   – "Zukunftsausgabe Umweltbildung" (environmental education – a future-oriented task) in the series entitled Bildung-Wissenschaft-Aktuell 6/89

   – "Umweltbildung in der EG" (environmental education in the EC)

   – a documentation of the international meeting of experts and the results of a survey, published in the series Studien–Bildung-Wissenschaft, Vol.79

– "Umweltbezogene Bildungsangebote an Hochschulen ausgewählter Länder" (environment-related education curricula at higher education institutions in selected countries) – summary of a three-volume report of the Institut für Europäische Umweltpolitik (Institute of European Environmental Policy) Bonn, published in the series Studien-Bildung-Wissenschaft, Vol.80.

8. Publication of an environmental manual for the widespread dissemination of new findings in environmental research. The text was compiled and edited by the Deutscher Forschungsdienst, Bonn.

9. Cooperation with the Federal Minister for Research and Technology and the Federal Minister for the Environment, Nature Conservation and Nuclear Safety as well as with international organizations (e.g. UNESCO) with a view to linking environmental research with environmental education as well as to strengthening interdisciplinary approaches and the practical orientation of relevant projects.

It will be crucial to the desirable further development of activities and measures on environmental education that the "Deutsche Stiftung Umwelt" (German Foundation for the Environment), which is currently being set up, establish environmental education as a priority of its work programme yet to be agreed and that it employ a considerable share of future funds for corresponding prospects."

VIII. Extracts from the Final Report Submitted by the Study Commission on "Future Education Policy – Education 2000" (Bundestag document 11/7820) of 5 September 1990

Corresponding to a motion put forward in the Bundestag by the Social Democratic Party and the Green Party DIE GRÜNEN (Bundestag document 11/801 of 15 September 1987) the German Bundestag unanimously decided on 9 December 1987 to appoint a Study Commission on "Future Education Policy – Education 2000".

In accordance with the government order to appoint the Study Commission (Bundestag document 11/1448 of 4 December 1987) the said Commission is to prepare decisions relating to education, social, labour market and financial policy within the framework of existing legislative competences as well as the budgetary law and right to exercise controls of the German Bundestag. Among other things the Study Commission is to present proposals concerning the requirements to be met by the Federal Government's education policy as a result of ecological exigencies.

In the recommendation for the decision and in the report of the Committee on Education and Science (19th Committee) concerning the interim report (Bundestag document 11/7381 of 13 June 1990) the Study Commission is requested to elaborate clear-cut, feasible recommendations on the basis of the following principles:

"– Responsible, pro-environmental behaviour and the adoption of a healthy lifestyle on the part of individuals, policymakers and entrepreneurs require the introduction of a correspondingly structured education policy at all levels of education – in kindergartens, schools, vocational training institutions, higher education institutions and further education institutions. Environmental education must teach people to behave with responsibility towards the environment in all spheres of life.

– Environmental education in a broader sense should not be confined to merely creating the prerequisites for people to be able to meet the requirements of more or less extensive environmental protection, but is committed per se to preserving the natural prerequisites for living.

– Every occupational activity is of relevance to the environment. Learning about the environment must therefore be included as an important learning goal in all curricula, training directives and examination regulations and be taught with emphasis on practical activities throughout the entire range of training and further education courses for all occupations. Instruction at schools and at higher education institutions must provide an opportunity for pupils and students to engage in subject-related – and particularly interdisciplinary – study of environmental issues. In addition to enhancing environmentally relevant qualifications in all occupations the possibility and necessity of a further professionalization of environmental protection activities and the development of corresponding occupational profiles (environmental advice, environmental protection officers in local government and in firms) must be considered and tested. The Federal and Länder governments, employers, workers and society at large must cooperate to achieve these goals.

– It is vitally necessary that training aids at all levels of education be rapidly further developed and that teachers in kindergarten, schools, in-firm training, vocational training and higher education as well as further education staff be properly trained and enabled to participate in further education programmes. Deliberations in this connection should incorporate the relevant experience gained by other countries throughout the world."

As regards most items of the Commission's final report the majority of the members – CDU/CSU and FDP MPs including the experts named by them – reach different conclusions and present different arguments than the minority of the Commission's members – SPD MPs and MPs of the Green Party including the experts named by them (cf. recommendations 1/13 on p. 52 and pp. 7/64 et seq. as well as of pp. 68 et seq.). None the less, the members of the Study Commission were unanimous as regards the assessment of, and some basic principles governing, future education policy. In particular, this consensus of opinion concerns the following environmental education issues:

1. "Education and training will continue to gain importance not only on account of its contribution to social cohesion, the development of democracy and to the individual's personal development but also on account of its relevance for safeguarding the country's prosperity, improving living and working conditions, and nature conservation" (p. 10).

2. Increasing environmental pollution and environmental hazards and, on the other hand, generally increased environmental awareness also challenge education policy. All training for occupational work must inspire students and trainees in all occupational sectors with a readiness to act in an environmentally compatible manner and also equip participants in programmes with the skills necessary to this end. This is a direct appeal to all education policymakers and corporate instructors to see that appropriate efforts are made in training and further training. Above and beyond this, increasingly stringent environmental protection requirements call for relevant skilling opportunities and training courses for staff charged with environmental protection tasks in private enterprise and public authorities." (p. 11)

IX. The Future Will Not Wait – Statement Made to the Press on 24 September 1990 by the Federal Minister of Education and Science, Jürgen W. Möllemann, on Environmental Education

Federal Minister of Education Jürgen W. Möllemann would like to see environmental education in the Federal Republic of Germany put on a new basis. In his statement on Monday, 24 September 1990, he said that "environmental education for children, adolescents and adults should create a basis for behaviour designed to counterbalance the orientation to mass consumption, the throw-away-mentality and the thoughtless exploitation of resources." The Federal Minister of Education and Science presented the results of an expert study, which was written on the basis of recommendations put forward by the Bundestag Study Commission on "Preventive Measures to Protect the Earth's Atmosphere."

According to Federal Minister Möllemann, the developments crucial to ensuring that environmental protection becomes reality will be established in education. The Federal Minister of Education spoke of a task which does not stop at national frontiers, which has an emminently political dimension and which, above all, concerns the quality of life of generations to come. In the words of Federal Minister Möllemann: "The future will not wait. Here again, he who comes too late will be punished by life".

Federal Minister Möllemann had appointed a thirty-strong commission of experts headed by Professor Helmut Becker, at that time Director of the Max Planck Institute of Educational Research in Berlin, to elaborate proposals for the practical implementation in appropriate education measures of the recommendations put forward by the Study Commission. On the basis of the results now available, the Federal Minister of Education submitted the following proposals:

1. General schools:

Federal Minister Möllemann lamented the fact that, despite the formal integration of environmental education in curricula at general schools, in practice instruction in this subject is frequently unsatisfactory. He suggested that:

– concepts be presented to ensure the practical implementation of cross-curricula instruction as well as ecology-based teacher training and continuing education;

– curricula be supplemented and, where necessary, given a new interpretation, meaning above all that the appropriate teaching materials be elaborated for all school levels;

– specific results of environmental research be actually integrated into in-service training courses for teachers.

2. Vocational training:

According to Federal Minister Möllemann, environmental protection has been given due consideration over the last 10 years in each revised training directive relating to vocational training. The regulations are, of course, couched in rather general terms and are hardly of relevance to examinations. Federal Minister Möllemann stated that "today every occupation is directly or indirectly linked to environmental protection." Therefore environment-oriented vocational skilling measures have acquired considerable importance for the environmentally compatible development of industrialized societies. The Federal Minister of Education proposed that

– training directives and outline plans be further supplemented without delay;

– providers of environmental qualifications – that is, corporate instructors, and teachers at part-time vocational schools – be given more adequate support;

– a pilot scheme programme on "Environmental Protection in Vocational Training" be launched in order to implement the findings of the Study Commission on Preventive measures to Protect the Earth's Atmosphere.

3. Higher education:

Federal Minister Möllemann stated that the Guide to environmental studies published by the Federal Environmental Protection Agency does provide evidence that many higher education institutions and Fachhochschulen have developed study programmes and postgraduate studies and some of them even self-contained study courses on environmental protection. None the less, the share accounted for by such eduational programmes in the overall provision in research and teaching is still negligible. Individual higher education disciplines tend to develop tunnel vision so that interdisciplinary issues are likely to be pushed aside. In the words of Federal Minister Möllemann: "What we need are more interdisciplinary, problem-oriented research structures – for example interdisciplinary study courses whose contents would also be reflected in the relevant examination regulations."

4. Further education

According to Federal Minister Möllemann, the goals and contents of environmental education as planned for general schools should also constitute a part of general further education. The range of programmes offered on ecological topics is still relatively narrow and, above all, it cannot be easily assessed at a glance. Federal Minister Möllemann called for a "teaching of knowledge related to all spheres of life".

The Federal Minister of Education appealed to those responsible in the Federal, Länder and local governments, to industrial associations, to the trade unions, to non-state providers of education and to teachers to give due consideration to the recommendations presented by the Study Commission on Preventive Measures to Protect the Earth's Atmosphere. Federal Minister Möllemann stated that he would challenge the competent education bodies to act. Today environmental education is an "indispensable element of modern general education".

Special Part

In the Federal Republic of Germany there are a variety of practice-related, interdisciplinary and action-oriented approaches to environmental education. The following is a survey of pilot schemes and research and development projects on environmental education supported with Federal Government money, with the individual chapters dealing with different sectors of education (young people, vocational training, academic training, further education and guidance). Mention is also made of training and further training regulations in these sectors. The last two chapters deal with the situation of environmental education in the new German Länder and at the international level.

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I. Environmental education of young people

1. Environmental education in public opinion polls

An opinion poll conducted by the EMNID institute for BMBW in 1985 (published as volume 20 of the series "Studien" of BMBW) revealed that more than 80% of young people considered environmental protection one of the most important political tasks. Only the reduction of unemployment was considered more important; the securing of peace and the reduction of youth unemployment followed in the list of priorities. A more recent poll conducted by the Dortmund educationist Rolff and his office for school development in 1987 even indicated that environmental issues were far ahead among the topics which young people considered to be of particular importance in school.

2. Recommendations of the Conference of Länder Ministers of Education (KMK)

The Länder Ministers of Education declared on 17 October 1980 that it was a task for school "to develop young people's awareness of environmental matters, to promote a willingness to conserve the environment, and to educate young people to behave responsibly in this respect throughout their lives. This task has become even more urgent as environmental pollution has assumed menacing proportions over the past decades. On the basis of their role in educating young people, schools can and must make their contribution towards solving this urgent problem. The aims of environmental education can be pursued by integrating it with contents of several traditional school subjects or through interdisciplinary courses. In this respect environmental education is an interdisciplinary educational principle which permeates natural science subjects and social science subjects alike." Two KMK reports deal with the implementation of this principle in curricula development. A third report is being prepared.

3. Study of the Institute for Science Education

The study "Environmental teaching practice in the Federal Republic of Germany" was conducted by the Institute for Science Education at Kiel University in 1986. The study provides information on the current situation of environmental education at general schools in 10 Länder (without Baden-Württemberg). It shows that at present environmental teaching is still in its infancy. It is usually related to only a few subjects, above all biology, rarely involves non-school institutions and, though problem-oriented, is hardly ever action-oriented. Furthermore, teachers are not sufficiently prepared to hold interdisciplinary project-oriented classes on environmental topics. Even where teachers are free to choose what they teach, they are hardly in a position to use this freedom properly.

Other major results produced by the study are:

- In an average of 9 subjects teaching includes one environmental topic per year.
- Environmental topics are most frequently dealt with in the subjects science education (primary school), biology, geography and chemistry.
- Environmental education at school is more frequent in the lower grades than in the upper grades.
- 64% of the schools have no environmental teaching modules.
- The equipment of schools with biotopes on the school premises is rather favourable (about 69% of the schools have the use of green spaces, school gardens, bodies of water, a school forest or experimenting areas).
- Usually teachers are very much aware of environmental problems, but owing to the overcrowding of syllabuses, the lack of time, and the fixed schedules (45-minute periods and 5 to 6 different subjects per day) they often consider it impossible to engage in environment-related initiatives. Only 18 per cent of teachers participated in in-service training for environmental education between 1983 and 1986.

- Project weeks play a surprisingly small role in environmental education.
- Only 6.1 per cent of environmental teaching modules are of a cross-disciplinary nature.
- Two thirds of all teaching of environmental topics accounts for about 4 lessons per school year. According to a rough estimate, primary education includes about 8 environmental lessons per school year and secondary education about 20 to 24 lessons.
- 87 per cent of environmental teaching is done in single and double lessons.

There are major deficits above all in the field of research on the impact of environmental education. Virtually no empirical work has been done on the question whether, and if so how, environmental education at school can successfully impart knowledge, change attitudes or even behaviour. A repeat poll supported with BMBW funds is to remedy the situation. The results are expected to be available by late 1991. The five new German Länder will be included.

4. Environmental protection competitions

Numerous competitions motivate young people to examine environmental questions. The response shows just how important is the subject. Here is a selection of the most important activities:

- Special prize for environmental work in the framework of the Federal competition **"Jugend forscht"** (young researchers).

  This special prize, which was first awarded in the 21st competition, has proved to be an additional incentive for many young people to engage in environmental research activities. In the coming years, too, the prize for the best project submitted will be funded by BMBW, with the prizes for the second and third best projects being donated by the Stern magazine and the Federal Ministry for Research and Technology (BMFT).

- **Pupils' competition for the Federal President's Prize 1986-87 "Umwelt hat Geschichte" (environmental history)**

  The competition was organized by the Körber Foundation, Hamburg, and involved themes of modern history. Young people were invited to investigate and describe the history of environmental problems in their home region. 1060 contributions were received from 5004 participants.

- **1986 schools competition of the Bundeszentrale für Politische Bildung** on the subject of "Environmental protection begins at home".

  Participation was not for individuals but for classes of pupils in grades 7 to 11. 504 classes took part.

- **European competition**

  For its 34th competition the European competition chose the title "Young people do research for environmental protection". The competition was held between August 1986 and August 1987 in the framework of the arrangements for the Year of the Environment 1987 and associated with the Youth Year 1986. The widespread impact of the competition was remarkable. 63,000 young people in the Federal Republic of Germany took part in the most recent competition.

- **Environment competition of the Federal Ministry of Education and Science**

At the request of the Federal Ministry of Education and Science, the Institute for Science Education at Kiel University (IPN) designed a nationwide environment competition. After the successful conclusion of the pilot project this competition will be held annually, the first time in 1990. The competition is to arouse young people's environmental awareness and their interest in ecological questions. The linking of cognitive and action-oriented elements plays a key role. Relevant information can be obtained from the IPN.

5. Pilot schemes exemplifying the systematic funding policy in the field of environmental education

a) OECD project on **"Environment and School Initiatives"**

With funds from the Federal Ministry of Education and Science and the Länder Bavaria, Hesse and Schleswig-Holstein, a project of the Organization for Economic Cooperation and Development (OECD) was carried out in 1987 involving three schools with an ecological tradition. In the Federal Republic of Germany the project was coordinated by the Institute for Science Education at Kiel University. At a joint meeting of representatives of OECD Member countries held in Linz (Austria) in September 1988 the different approaches in environmental education were identified and examined for their transferability. A follow-up project has meanwhile been launched with funds being provided by BMBW and the Länder Lower Saxony, Hesse and North Rhine-Westphalia. This project involves both schools and environment centres. It is coordinated by the German Society for Environmental Education and Hanover University.

b) Pilot scheme of Land Baden-Württemberg

"Family – health – environment – contributions to preparatory education in schools"

The project is aimed at the practical application of existing theoretical concepts for environmental and health education in close cooperation with schools and non-school institutions. A lasting impact can only be guaranteed if integrated and interdisciplinary teaching models are developed. Some major results such as the teaching guide on "Instruction concerning interdisciplinary topics" published in the official journal of the Baden-Württemberg Ministry for Cultural Affairs and Sports nos. 16/1987 and 6/1989 have been implemented in many schools. In addition there are a number of model schools which have gained an international reputation. Special mention should be made of the urban ecology model of the Uhland school in Mannheim and the "waste-free school" in Merdingen. Numerous cooperative activities involving schools in the five new German Länder have been initiated.

c) Pilot scheme of Land Bavaria

"Encouraging ecological thinking among pupils and adults in a city through the establishment of a central school biology office"
(Nuremberg)

The project aims to establish cooperation among school gardens in a city through the creation of a central school biology office. A transferable model for an ecological infrastructure is to be tested taking into account the needs of a city. The purpose was to involve local environmental protection organizations in relevant activities. The pilot scheme enjoys separate scientific support.

d) Pilot scheme of Land Bavaria

"Environmental education at primary and secondary general schools in rural areas"

The project aims to develop and test regional and local models of environmental education at rural schools. In this connection the design of the school environment and the school gardens is as important as the incorporation into classroom teaching of environmental protection activities by teachers and pupils. The pilot scheme enjoys separate scientific support.

e) Pilot scheme of Land Berlin

"Environmental education and ecological design of the school environment"

This project aims to develop and test a cooperative, hands-on, interdisciplinary concept for a regional environmental education network. At the same time consideration is given to teacher in-service training and the establishment of minimum requirements relating to such a network. Another problem tackled is the ecological design of school buildings and school premises. The concept "Grün macht Schule" ("Green is in") developed under this project has been implemented throughout Land Berlin. A handbook is being prepared for the transfer of results to schools in other Länder.

f) Pilot scheme of Land Bremen
"Practice-oriented studies on ecological issues with a view to their inclusion in secondary level II curricula at vocational and grammar schools"

This pilot scheme aims to promote interdisciplinary and inter-system cooperation between vocational and general schools through the development and testing of the necessary organizational measures (including the establishment of an environment laboratory, different forms of teaching mixed age groups, examination credits) and curriculum modules (in the social and natural sciences, with regard to "ecology" as a subject, and with regard to trained occupations). There is to be a feedback concerning the results of cooperation with non-school institutions (universities, ecostations, guilds, Senate). The pilot scheme is supported by scientific research.

g) Pilot scheme of Land Bremen
"Development of a model for environmental education through networking the programmes available, involving above all the overseas museum, the ecology station and BORDA (Bremen Overseas Research and Development Association)"

The project aims to develop and test environmental teaching cooperation between schools and non-school institutions and the Bremen overseas museum. Starting out from the pedagogic principle "from the near-by to the more distant", a concept is to be designed for the networking of environment-oriented thinking and knowledge of ecological problems at home and abroad, to some extent including also the Third World.

h) Pilot scheme of Land Bremen
"Cross-curricular environmental education at general schools and inclusion of a pool of experts"

Under this project interdisciplinary environmental education programmes are to be developed starting with chemistry classes. A major feature is that external experts are to be invited to participate in teaching. The concept involves designing cross-curricular teaching and learning patterns which not only draw on the resources of traditional school subjects but also integrate practical and application-oriented elements. The pilot scheme is supported by scientific research.

i) Pilot scheme of Land Hamburg and Land Bavaria
"Environmental education at school country hostels"

Environmental education must relate to real-life examples. Classroom teaching is also expected to benefit from school country hostels, where, far removed from their classroom routine, boys and girls are given an opportunity to discuss environmental questions and experience environmental protection. The pilot scheme aims to transform school country hostels into environmental education centres and to test appropriate models for integrating periods at school country hostels into classroom teaching through efficient preparation and follow-up. This involves the principles of "practical learning" and "learning at different places". The inclusion of institutions in the new German Länder is being prepared.

j) Pilot scheme of Land Hamburg
"Environmental education and environmental advising at the Education Department of Hamburg University"

The aim is to develop a model for the integration of the theory and practice of ecological teaching into academic training and further education. A means to that end is the establishment of a four-semester graduate course on "environmental advising" and of a refresher course on environmental education for teachers in service.

k) Pilot scheme of Land Hesse
"Extra-mural projects as a contribution to environmental education in biology classes at all types and levels of school"

The aim is to develop models for cooperation with environmental centres and other places of environmental learning in the Kassel area. This includes above all programmes which supplement biology classes by extra-curricular practical learning.

l) Pilot scheme of Land Lower Saxony
"Cooperation between schools and an environmental centre run by a nature protection society"

This project aims to draw up a concept for cooperation between schools and a nature protection society via an environmental centre serving as an extra-mural place of learning and a coordination centre (Deutscher Bund für Vogelschutz – Gut Sunder/German bird protection society – Sunder estate)

m) Pilot scheme of Land North Rhine-Westphalia
"Nature and the environment in kindergarten education"

The pilot scheme aims to develop and test environmental teaching concepts for elementary education which enable kindergarten teachers, advisers, and training personnel to handle environmental topics in a manner comprehensible to pre-school children by using suitable material. A child-centred approach is crucial since children are easily discouraged if material (including games) is passed off as suitable for children but actually caters to adults. Educationists and psychologists are called upon to cooperate under this project. The project also includes modelling for an ecological design of the establishments themselves. The results of the project will be implemented in training and further training. A final report will be published in 1991 and can be obtained from: Sozialpädagogisches Institut, Richard-Wagner-Str. 12, W-5000 Köln 1.

n) Pilot scheme of Land Rhineland-Palatinate
"Practice-related environmental education in schools by means of cooperation partnerships with non-school institutions in Land Rhineland-Palatinate"

This project aims to provide action-oriented, experience-based environmental education through cooperation with non-school institutions taking into account local and regional conditions and to provide models for cooperative activities and partnerships. The target groups are boys and girls in primary education, at the orientation stage, and in secondary level I. The cooperation partners are a forestry office, an open-spaces authority, a nature protection association and a museum of local history and culture. The project aims to develop a concept for the infrastructure required for efficient cooperation and to find out what is feasible under specific conditions as regards formal and informal environmental education. The results of this project, which are published in a journal entitled "Umwelterziehung praktisch", are available to interested schools and teachers.

o) Pilot scheme of Land Saarland
"Integrated environmental education in schools including the establishment of a central environmental education office"

Traditional environmental protection such as nature conservation and newly arising problems such as the protection of air, water and soil as well as waste disposal should be included in environmental projects supplementing school education and teacher in-service training. Accordingly, several working groups have developed curricular modules which can be retrieved at any time from a regional central environmental education office. Under this project, which will be concluded in 1991, the various environmental education institutions in a small Land have been linked successfully in such a way as to enable every teacher to find the materials and information on contents and methods required for specific environmental programmes. The project can be tranferred to other areas, above all to the administrative district level.

p) Pilot scheme of Land Schleswig-Holstein
"Health promotion in everyday schooling, measures for a healthy lifestyle (nutrition, exercise, experiencing nature/designing the environment)"

The project aims to link environmental education and health education at different levels and types of school. It focuses on measures encouraging environmentally sound and healthy behaviour. The broad-based model involves the participation of school administration, teachers, parents, adolescents and children. The project is supported by scientific research.

6. Coordination of the pilot schemes on environmental education

In 1988 the Federal Minister of Education and Science initiated a series of meetings of experts entitled "Models for environmental education in the Federal Republic of Germany", which are to serve as forums for presenting relevant results of ongoing or concluded pilot schemes to a wider public and for establishing closer links between the various initiatives launched under the pilot schemes. While the first such meeting, held in Koblenz in 1988, dealt with general conceptual issues of environmental education at school, subsequent meetings treated special problems that had emerged during work under the pilot schemes. In 1989 a meeting was held in Clausthal-Zellerfeld on the subject of Regional school networks for environmental education. In 1990 experts met in Hamburg to discuss problems of environmental education in conurbations. These meetings of experts, which, as a rule, take the form of supraregional working conferences, involve not only policymakers but also staff members of school administrations and environmental protection institutions as well as teachers. Together with the education and environment ministers of the Länder, the Federal Minister of Education and Science thus contributes to the networking of pilot scheme initiatives and to the application and transfer of their results. Conference proceedings can be obtained from the IPN.

7. Research projects

a) Otto-Blume-Institut for Sozialforschung und Gesellschaftspolitik e.V. Köln
"Occupation-oriented environmental education in general schools"

The project aimed to identify the opportunities and limits of occupation-oriented environmental education in general schools. By identifying specific environmental education models including practical work periods, project teaching and environmental adviser participation, curriculum modules were identified for action-oriented, i.e. occupation-related, teaching of environmental contents in general schools. A limited number of copies of the project documentation are still available and can be obtained from BMBW. This documentation illustrates that action is needed in this field.

b) Institute for European Environmental Policy, Bonn
"Environmental education – a challenge for European education policy"

The purpose of the project was to prepare the resolution of the EC Council of Education Ministers on environmental education adopted in 1988.

c) Institute for European Environmental Policy, Bonn
"Documentation on environmental education in the European Communities"

The purpose of the project was to prepare a documentation on environmental education in Europe, with a Eurydice poll initiated by BMBW serving as its basis. At the same time, the documentation was to present the papers and discussions of the EC environmental education conference held in Dortmund in February 1988. The results of this project were published in the BMBW series "Studien", vol. 79 obtainable from booksellers).

d) Institute for Biology Teaching of Munich University
"New approaches in environmental education involving non-school institutions and in particular foreign experience (USA)"

The purpose of the project was to formulate recommendations for the optimization of activities involving environmental centres in youth and adult education on the basis of the American experience. The final report provides ample information on informal education in national parks and environmental centres in the United States. The results can be obtained from the implementing agencies.

e) Deutsche Gesellschaft für Umwelterziehung e.V. Kiel
"Schools and other places of learning in environmental education" (Villa Vigoni, 14 – 17 March 1989)

This meeting of experts was held to identify and discuss German and Italian projects on the networking of formal and informal environmental education, referring inter alia to the OECD project "Environment and School Initiatives", which has meanwhile been concluded. The meeting formulated elements for a more effective design of the interface between formal and informal education. The documentation can be obtained from the IPN.

f) Max Planck Institute for Meteorology, Hamburg
"Protecting the Earth's atmosphere by thinking globally and acting locally"

The purpose of the project was to identify concepts for including issues of climatic research while taking into account the results of the Study Commission "Preventive Measures to Protect the Earth's Atmosphere".

g) Bremen Overseas Museum
"Handling the apocalyptic mood"

At a meeting of experts in March 1991 environmentalists, educationists and youth researchers discussed the psycho-social dimension of environmental education. Fear and resignation as well as hyperactivism topped by stress resulting from confrontation with environmental problems in the media make exacting demands on teachers, which they cannot always satisfy. Therefore concepts are to be developed to enable teachers to handle the psycho-social implications of environmental education and to incorporate them into practical environmental teaching. The meeting was not restricted to a specific Land. The results will be published. The documentation can then be obtained from the IPN or the organizer.

h) Bundeselternrat Hamburg (federal parents' council)
"Environmental education and parents' participation"

At several seminars the Bundeselternrat, the association of the parents' councils of the Länder in the Federal Republic of Germany, discussed problems of environmental education from the parents' viewpoint. Some of these seminars were closely related to pilot schemes promoted by BMBW. The results, which are available in the form of resolutions, can be obtained from the office of the Bundeselternrat.

II. Vocational training and environmental education

1. Basic environmental education in vocational training

Occupational activities in industry and the crafts, in commerce and the service sector, in agriculture and transport, today can no longer be considered without taking account also of their implications for the environment. Every occupation is related directly or indirectly to environmental protection or – in other words – almost every occupational activity involves potential hazards to the environment. An environmentally compatible development of an industrial society therefore depends to a major extent on the environment-related vocational skills of the industrial players. Responsible action requires relevant occupational skills, a basic knowledge of the technical, physical, chemical, biological and ecological interrelations as well as the willingness to change one's behaviour as a result of insight and motivation.

2. Environmental education in training regulations

Since all occupations are related to environmental protection, it is obvious that existing occupational structures should be taken as a basis for environmental vocational training. The explicit inclusion of specific goals of learning in training directives is the first step to including the teaching of occupation-specific environmental knowledge and skills in vocational training. Environmental contents are taught in an integrated approach, i.e. they are related to occupation-specific training contents and the students' future functions.

Since 1984 environmental protection has been included in occupational profiles as a standard item such as "industrial safety, accident prevention, environmental protection and energy conservation." Relevant goals of learning have been established. Depending on the environmental relevance of the occupation involved, the training directives furthermore integrate subject-oriented goals of learning with action-oriented ones, thus indicating the environmental importance of certain training contents and making environmental protection an explicit part of intermediate and final examinations.

The first self-contained environmental protection occupation, which was recognized by the government in 1984, is that of "technician in supply and waste management" (Ver– und Entsorger). Training takes place in water works, at sewage treatment plants, in the sewerage system or in waste treatment facilities, where trainees acquire skills in three branches: water supply, waste water and waste (also for the occupation of adjuster). Technicians in supply and waste management control technical processes (including manual technical skills); their task is in particular to avoid environmental pollution and damage.

3. Recommendations by the Central Committee of the Federal Institute of Vocational Training

The Central Committee of the Federal Institute of Vocational Training (BiBB) issued a recommendation on 4/5 February 1988 which indicates possible ways for companies and schools to make environmental protection an integral part of vocational training and lists the material and staff requirements for acting on the proposals.

Building on environment-related instruction in general schools, vocational training and further training must provide insights into the potential impact of occupational work on the environment as well as in the problem arising from changes in the environment. Environmentally relevant contents of vocational training should motivate each individual member of the work force to use natural resources responsibly and avoid hazards to the prerequisites for living out of a sense of responsibility for future generations while bearing in mind the goals of economic growth and technological progress.

In general – also with a view to increasing activity-based learning and learning efficiency – teaching environmental contents should be directly related to the relevant subject contents of the training or further training course concerned.

The Central Committee therefore recommends the following:

- inclusion of occupation-related environmental training contents and examination requirements in new training and further training directives as well as in those relevant directives which require revision;
- preparation of environmentally relevant material for vocational training practice (media and practical aids, teaching and learning material);
- further training for vocational training staff (instructors) in companies and inter-firm training institutions as well as in-service training for vocational school teachers.

4. Pilot schemes in vocational training

a) Pilot scheme of the Munich Institute for Film and Image in Science and Education
"Audiovisual Media in Vocational Training for the Efficient Use of Energy"

Under this pilot scheme the production of a series of instructional films was funded (1982 to 1985), all of them dealing with environmental protection. In some of these films, for example those on "Energy utilization and environmental pollution" and "Renewable sources energy", it is even the central topic.

b) Pilot scheme of Land Baden-Württemberg
"School for technical environmental protection; certified technician, mechanical engineering/process and environmental technology"

The purpose of the project is to teach process technology, laboratory technology as well as the recording and processing of measured values at a mechanical engineering school. The syllabus covers environmental protection measures including pertinent law; laboratory technology and analytical chemistry including trace analysis; measurement and control technology including sensor technology; process technology with particular emphasis on environmental technology. This pilot scheme is to identify i.a. the qualification requirements to be met by project teachers. Consideration is given not only to various goals and forms of learning but also to the equipment required. Scientific support is provided in close cooperation with the school involved in the pilot scheme, the firms concerned and the competent environmental protection authorities. Coordination is provided by the Landesinstitut für Erziehung und Unterricht.

c) Pilot scheme of Land Bavaria
"Environmental education – a task for part-time vocational school"

The purpose of the pilot scheme is to develop and test teaching modules which are suited to impart to pupils the insights and attitudes which are necessary for environment-conserving occupational work. The pilot scheme focusses on agricultural occupations and on industrial trades. All programme measures are tested for one trained occupation out of each occupational field.

d) Pilot scheme of Land Berlin
"Modules for non-subject-related skilling of instructors and trainees in the chemical industry focussing on ecology and social skills"

This pilot scheme, carried out at the firm of Schering AG, deals with the enhancement of non-subject-related environmental and social skills in connection with the teaching of occupational contents. The project involves the development and testing of programmes for the skilling of instructors for the occupations of laboratory assistant/chemistry, laboratory assistant/biology, skilled worker, chemical industry and skilled worker/pharmaceutical industry. Scientific support is provided.

e) Pilot scheme of Land Bremen
"Ecological construction – development and testing of curricular elements"

This project involves the inclusion in instruction of new educational contents concerning ecological and environmentally compatible construction as well as building biology in the occupational fields of "structural engineering", "wood technology", and "colour technology and interior design". The project covers the basic vocational training year, part-time vocational school (bricklayer, concrete worker, roofer, carpenter, joiner, painter), full-time vocational school awarding vocational qualifications (BFS/g), the vocational Fachoberschule (structural engineering and architecture) and the upper secondary grades in grammar school (structural engineering as a main subject). The project was concluded in 1990. The results of the pilot scheme and the supporting research are available from the competent Bremen Senate authority or the Schulzentrum der Sekundarstufe II, Alwin-Lonke-Straße.

f) Pilot scheme of Land Bremen
"Environmental protection and new technologies in the occupations of the construction industry and construction-related trades"

The project develops and tests curricula for teaching knowledge of environmentally compatible building, both relating to and not relating to specific occupations, i.e. specialized knowledge which can be applied in practical work. The project is based on the results of the pilot scheme on "ecological construction".

g) Pilot scheme of Land Bremen
"Development and testing of ecologically oriented training programmes for the food trade"

Since food is of great personal importance to everybody, it is among the most important topics of vocational training from the ecological viewpoint. The pilot scheme attempts to systematically include ecological questions in training for the food trade and to prepare suitable teaching materials. The project focusses on the development and testing of training programmes for bakers, butchers, cooks and food technology specialists. The project is carried out at the vocational school for the food trade in Bremen. Consideration is given not only to the contamination of raw materials, to toxicological questions and to the physiology of nutrition but also to processing, technological and economic aspects.

h) Pilot scheme of Land Hamburg
"Environmental advisers in the craft trades"

The project aims to develop and test 5-semester skilling during employment for craftsmen/craftwomen and master craftsmen/craftswomen to become environmental advisers in the craft trades. Relevant courses focus on inter-trade basic skills, special skills regarding the handling of innovative techniques and products, the teaching of cooperation and communications skills as well as customer advising. The project is run by the Hamburg Chamber of Handicrafts, at the Hamburg-Zentrum für Energie-, Wasser- und Umwelttechnik (ZEWU), with scientific support being provided by the Prognos AG Basel.

i) Pilot scheme of Land Lower Saxony
"Introduction of new technologies into initial vocational schooling in the field of supply technology"

The pilot scheme is to identify ways of introducing elements of modern control technology into vocational school instruction in the framework of initial training for supply technology occupations (heating, ventilation, sanitation). The actual classroom work of previously trained staff is to be analysed.

j) Pilot scheme of Land Lower Saxony
"Environmental protection in part-time vocational schooling for construction-related occupations (didactic concept)"

The purpose of the project is to develop and test a concept for environmental teaching at part-time vocational schools integrating occupational skills and ecological competence. Scientific support is provided.

k) Pilot scheme of Land North Rhine-Westphalia
" Development of curricula and testing of technical school programmes in the fields of refrigeration technology, waste water technology, waste technology and water supply"

The educational programmes to be tested under this project are at the technician level, i.e. they involve technical schools (middle management level). The special thing about the new programmes is that participants must have two years' practical working experience as technicians. The first 62 participants were awarded certificates on 31 May 1990.

l) Pilot scheme of Land North Rhine-Westphalia
"Development of an environmental protection skilling concept for small and medium-sized enterprises in the retail trade"

Starting out from a holistic environmental education concept for enterpreneurs and instructors in small and medium-sized enterprises, this project above all develops and tests further training and guidance programmes. The project focuses on basic seminars and research into specific materials concerning environment-oriented management and environment-oriented training and further training. Scientific support is provided.

5. Further training

a) In the Federal Government's ordinances on further training and retraining attention is given to environmental problems in all relevant areas, e.g. in the ordinances stipulating the examination requirements for the Industriemeister certificate, where environmental protection is an examination subject. This approach has proved successful. Environmental protection will also be included as an important examination subject in future ordinances on further training and retraining.

b) The ordinance stipulating the final examination requirements for the recognized qualifications of **"Meister certificate in supply and waste management"** of 23 January 1987 is of particular importance. Through this ordinance the Federal Minister of Education and Science has officially recognized the advanced qualifications of "Meister in water management, Meister in waste water management and public cleansing Meister". These are the first environmental protection qualifications at Meister level to have been officially recognized at the national level.

Special qualified personnel is needed in supply and waste management so that all relevant measures to protect public health and the environment can be taken. The newly created Meister qualifications in supply and waste management are therefore of particular importance to the general public. The Meister in supply and waste management will be able to work at the local government level and in any company that operates relevant facilities.

In order to obtain the Meister qualification, applicants are as a rule required to hold a certificate for a pertinent recognized trained occupation and produce evidence of subsequent practical work of at least three years' duration. Applicants may also be admitted if they can prove that they have acquired knowledge, skills and experience which justify admission to the examination.

c) The Katholischer Deutscher Frauenbund (German Catholic Women's Union) in Cologne has developed a further education programme, **"Ecology"**, which is to enable women to cooperate in consumer initiatives, in environmental protection organizations and lobbies concerned with environmental questions. It is assumed that women, on account of their experience in the family environment, are particularly sensitive to environmental issues and, with additional qualifications, can become active in an honorary capacity or take on a second job in an area for which there have so far been hardly any defined job profiles. The Federal Minister of Education and Science is promoting this pilot project under the slogan "Homemaking as a stepping stone to qualifications in the world of work and in society".

d) The pilot scheme **"Environmental protection training for instructors"** is aimed at the development and testing of different concepts for further education for instructors. The project is supervised by the Federal Institute of Vocational Training (BiBB). It is carried out by the working group on environmental protection and vocational training at the institute of vocational education theory of Hanover University. The duration of the project is four years. It is funded by

the Federal Government and Land Lower Saxony. During the project it is to be examined whether and, if so, how the concepts framed for the training of instructors and relevant training materials can be made generally applicable and transferable.

e) Under the project **"The impact of recent environmental protection legislation on further education requirements in selected craft trades"**, the Consult-Gesellschaft für Energie, Wirtschaft und Umwelt mbH (GEWU) investigated the need for further education in the fields of sanitation, heating and air conditioning as a result of the environmental protection laws adopted in recent years. The Berlin area was chosen as a conurbation representative of the whole industry. A further education catalogue was drafted listing the qualification requirements which have been identified.

6. Inter-firm training centres

The Federal Minister of Education and Science developed and tested concepts for environmental occupations at 6 inter-firm training centres. Among these were the centre for technology, energy and environmental protection in Münster (establishment of a centre for new technologies and environmental protection in Münster), the vocational training centre of the Braunschweig Chamber of Handicrafts (two projects on the planning and construction of laboratory workshops for the fields of waste management and energy as well as environment), the further education centre of the Confederation of German Trade Unions (acquisition of a farm in Heikendorf with a view to establishing a training centre for environment and nature conservation as well as upgrading of the equipment of the training centre in Neumünster for the field of supply and waste management, environmental protection and biotope maintenance) and the Deutscher Kraftfahrzeug-Überwachungsverein e.V. – DEKRA (establishment of a training workshop for environmental technology, building machinery and automotive engineering of DEKRA Stuttgart for DEKRA Flensburg).

7. Research project "Environmental education in vocational training"

The International Labour Office in Geneva has been commissioned by the Federal Minister of Education and Science to study measures for environment-related training and further training in different occupations in selected countries. The aims are to analyse the programmes offered as well as to identify the qualification requirements in various fields of environmental protection.

III. Environmental issues in academic training

1. Guide to environmental studies (Studienführer Umweltschutz)

The Guide to environmental studies is published by the Federal Environmental Protection Agency. The fourth edition 1988 lists:

- 49 universities and 42 Fachhochschulen offering a total of 186 courses including environmental protection as a study focus,
- 1 university and 1 Fachhochschule offering one self-contained environmental protection study course each, and
- 14 universities and 4 Fachhochschulen offering a total of 22 post-graduate study courses on environmental protection. (see the following table).

The introduction to the Guide points to the fact that almost all "relevant study courses" treat environmental protection issues in more or less detail; these courses include above all biology, architecture, agricultural science, civil engineering, process technology and geography.

In addition, students have other opportunities for information and study. A random survey of university calenders revealed that the majority of higher education institutions considered offered environmental studies within the framework of the Studium Generale.

Environmental protection as a self-contained study corse	Berlin TU	Rheinland-Pfalz FH
Environmental protection in engineering	●	
Environmental protection		●

Study courses with environmental protection as a study focus at universities, comprehensive universities, colleges of education

	TH Aachen	U Bayreuth	FU Berlin	TU Berlin	U Bielefeld	U Bochum	U Bonn	TU Braunschweig	U Bremen	TU Clausthal	TH Darmstadt	U Dortmund	KU Eichstätt	U Erlangen-Nürnberg	GH Essen	PH Flensburg	U Frankfurt	U Freiburg	U Gießen	U Göttingen	Fern U Hagen	U Hamburg	U Hannover	PH Heidelberg	U Heidelberg	U Hohenheim	U Kaiserslautern	U Karlsruhe	GH Kassel	U Kiel	U Köln	U Konstanz	H Lüneburg	EWH Rheinland-Pfalz	U Marburg	TU München	U Münster	U Oldenburg	U Osnabrück	GH Paderborn	U Regensburg	U Saarland	GH Siegen	PH Schwäbisch Gmünd	U Stuttgart	U Trier	U Tübingen	U Witten/Herdecke	GH Wuppertal
Agricultural biology																									●	●																						
Agricultural science							●												●	●						●			●							●													
Architetecture								●																			●																					
Civil engineering	●					●					●				●								●				●	●	●															●				●
Biology					●			●															●					●		●	●	●			●												
Chemical engineering														●														●																				
Chemical technology												●																																				
Energy and process technology				●																																												
Forestry																				●																												
Geography						●			●				●																	●	●				●												
Geology-palaeontology								●	●	●	●																	●		●																	
Geo-ecology		●																										●																		
Landscape conservation															●								●													●										
Landscape planning				●																									●																	
Teacher training					●			●				●		●		●	●					●	●	●					●					●												
Programmes for all study courses																										●																			●	
Mechanical engineering	●														●												●														●				●	
Ecology and environmental education																																														
Physics																									●																					
Psychology						●															●																●									
Regional and environmental planning												●															●																			
Law									●								●	●	●			●								●												●			●	●	
Safety engineering																																														●
Social science / political science																																					●									
Town planning																									●				●																	
Process technology										●																																				
Surveying											●																																			
Economics / Business administration		●	●	●																					●				●								●						●	●	
Industrial engineering				●																																										

Source: Guide to environmental studies

Study courses with environmental protection as a study focus at Fachhochschulen	FH Aachen	FH Aalen	TFH Berlin	FH Biberach	FH Bielefeld	FH Bochum	FH Bergbau Bochum	H Bremerhaven	FH Coburg	FH Darmstadt	FH Düsseldorf	FHT Esslingen	FH Frankfurt	FH Wehenstephan	FH Fulda	FH Furtwangen	FHV Gelsenkirchen	FH Gießen-Friedberg	FH Hagen	FH Hamburg	FH Hamburg	FHV Hannover	FH Hildesh./Holzminden	FH Karlsruhe	FH Kempten	FH Kiel	FH Köln	FH Konstanz	FH Lübeck	FH Nordostniedersachsen	FH Rheinland-Pfalz	FHT Mannheim	FH München	FHV München	FH Münster	FH Nürnberg	FH Nürtingen	FH Oldenburg	FH Osnabrück	FHW Pforzheim	FH Regensburg	FHTW Reutlingen	FH Rottenburg	FH Saarland	FHT Stuttgart	FH Ulm	FH f. Poliz. Villingen-Schw.	FH Ravensburg-Weing.	FH Wiesbaden	FH Wilhelmshaven	FH Braunschweig-Wolfenb.
Apparatus engineering																															●																			
Architecture				●																		●	●			●							●																	
Civil engineering				●	●	●				●								●	●			●				●	●			●			●			●		●			●				●					
Building physics																																																		
Operations and supply engineering								●																																										
Bio-engineering																				●																															
Bio-technology			●																																															
Chemistry		●	●																																							●								
Chemical engineering	●																																																
Chemical technology																															●					●														
Chemical technology										●																																								
Energy and heat technology																		●																																
Nutrition and domestic science																																																	
Forestry																						●																											
Landscape conservation			●											●																								●												
Agriculture														●																																				
Programmes for all study courses																●								●																									
Mechanical engineering	●								●															●			●																					
Physical technology																																		●															
Senior executive police service																					●																											
Social work / out-of-school education					●																																											
Health technology (environmental and sanitary technology)																		●											●																			
Process technology			●				●				●		●															●			●	●				●												
Supply technology			●									●															●				●					●												
Senior non-technical administrative service																	●																															
Economics / business administration															●																●								●								

Source: Guide to environmental studies

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Environmental protection as a post-graduate study course	U Bielefeld	GH Essen	U Göttingen	U Hannover	U Kaiserslautern	U Karlsruhe	GH Kassel	U Konstanz	Ph Ludwigsburg	FH Lübeck	H Lüneburg	TU München	FH Nordostniedersachsen	U Oldenburg	FH Saarland	U Saarland	U Trier	GH Wuppertal
Waste management													●					
Civil engineering / surveying						●												
Civil engineering / water resources management				●														
Bio-geography and regional development assessment																●		
Biology and ecology								●										
Energy technology							●											
European environmental diploma					●											●	●	
Forestry			●															
Use of renewable energy sources														●				
Ecology		●												●				
Ecology – environmental protection											●							
Ecosystems conservation							●											
Safety engineering																		●
Environmental studies															●			
Health technology (environmental and sanitary technology)										●								
Environmental advising	●																	
Environmental education and nature conservation management									●									
Environmental technology												●						
Environmental process technology						●												

Source: Guide to environmental studies

2) Research projects supported by the Federal Ministry of Education and Science

a) The Institute of European Environmental Policy (Bonn/London/Paris/Brussels), which is headed by Professor Ernst Ulrich von Weizsäcker), has presented a study entitled **"Umweltbezogene Bildungsangebote an Hochschulen ausgewählter Länder" ("Environment-related education programmes at higher education institutions in selected countries").** This study was completed in 1988 with funds provided by the Federal Minister of Education and Science and subsequently published in the series "Studien" (Vol. 80) of the Federal Ministry of Education and Science (available from booksellers). The study includes environmental education programmes available at European universities in the Netherlands, Sweden, Switzerland, Austria, Great Britain and France as well as in the United States. The closing chapter includes recommendations for the Federal Republic of Germany, which relate above all to the promotion of interdisciplinarity and to the participation in academic programmes of experts with practical experience of environmental protection. The report also states that the liberalization of study courses (that is, the introduction of measures to counteract trends towards excessive reglementation which block creativity and initiative), could constitute an appropriate way of incorporating in teaching programmes not only the latest results of environmental research (among other things ecosystems research) but also the urgent need to put environmental protection into practice. The proposals refer to study courses in natural science, engineering science, the humanities and sociology.

b) The Working Group on Environmental History at the University of Göttingen developed and tested the **concept for an interdisciplinary summer academy as an instrument of environmental further education.** The aim is to open up the university as a centre of environmental further education for experts from different sectors (among others, public administration and teaching). Relevant documentation can be obtained from the working group.

3) The "European Diploma in Environmental Sciences"

The "European Diploma in Environmental Sciences" can be gained through participation in a joint, bilingual, environment-related post-graduate study course offered by six higher education institutions in France, Belgium, Luxembourg and the Federal Republic of Germany, the aim being to train "European environmental specialists" or "environmental administrators" (e.g., at the universities of Trier, Kaiserslautern and Saarbrücken). The diploma is recognized in all four participating countries and features increasingly in job advertisements.

4) Further education study courses

a) The Institute of Plant Physics at Tübingen University carried out a project on **"Basic biological principles of ecology"** with funds from the Federal Ministry of Education and Science with a view to developing and testing, during implementation, distance study programmes incorporating attendance phases. The project was taken over by the Baden-Württemberg Academy of the Environment.

b) The Minister of Science and Art for Land Hesse is conducting a project with funds provided by the Federal Ministry of Education and Science on the **"Development and linking of study courses and further education programmes in the sector of energy management and municipal environmental planning".** A three-semester post-graduate study course for graduates in engineering and natural science subjects is envisaged as well as a further education programme for staff members of local government administrations. Study subjects will be energy management, environmental planning and environmental protection. Post-graduate studies and further education are to be linked by enabling students from both sectors of study to participate jointly in a number of teaching events. The Institut für kommunale Wirtschaft und Umweltplanung (institute of local industry and environmental planning), which was set up jointly by the Fachhochschulen in Land Hesse and by Kassel comprehensive university, is responsible for organizing further education programmes. The municipalities in Hesse share in the funding of further education via the fees received from participants.

c) At the Zentrum für Energie-, Wasser– und Umwelttechnik (Centre of Energy, Water and Environmental Technology) at the Hamburg Chamber of Handicrafts, the Hamburg-Harburg Technical University and the Hamburg Fachhochschule intend to carry out a joint pilot scheme together with the Chamber of Handicrafts on the topic of **"Technological development, transfer and continuing education in the sectors of environment and water resources as a co-operative project involving higher education institutions, chambers of handicrafts and industry".** Under this project new environmentally compatible and resources-conserving techniques, appliances and processes – particularly with regard to water supply and waste water management – will be developed and tested and made available to craftsmen's establishments (plumbers, gas fitters, etc., and firms using water for commercial purposes) for demonstration and further education purposes. The pilot scheme is to test technology and eco-specific transfer from academic research (new enabling technologies that are already available) to medium-sized and small enterprises as a pioneering measure for later application also in other regions.

d) The purpose of the pilot project set up by Land Lower Saxony on **"Basic principles governing the use of renewable sources of energy"** is to develop and test a one-year course of practice-oriented post-graduate study designed for engineers and scientists. Participants are chiefly to be drawn from the foreign students graduating in relevant study courses at German higher education institutions. Training will focus on the basic theoretical principles of renewable sources of energy, energy converting and energy storage techniques as well as the mathematical modelling of development-specific issues.

e) Since 1987 the Centre of Scientific Further Education at Oldenburg University has been implementing the pilot study course entitled **"Refresher course in ecology"** as a two-and-a-half year further education programme for gainfully employed persons. The study course is interdisciplinary in nature, comprising study contents in the fields of natural science and sociology.

f) The pilot scheme on **"Further education studies in environmental advising"** (Bielefeld University) set up by Land North Rhine-Westphalia is designed as an integrated further education course in biology, chemistry, human biology/medicine/science of education, sociology/political science. It is designed as a subject-related four-semester teaching programme with a framework comprising 80 hours' teaching per week. In addition, project-related intensive phases of study with a practical orientation and voluntary participation in weekend seminars can be chosen as components of the study programme. The course is intended to attract not only employed persons from different institutions with varying initial training qualifications but also graduates from higher education institutions who want to work as environmental advisers on the conclusion of their studies. Above and beyond this, gainfully employed persons with at least two years' work experience but no academic degree may also participate in this study course. The required aptitude will be established by the higher education institutions on the basis of subject-related and pedagogic diagnostic techniques.

5) Cooperation projects between higher education institutions and the new German Länder

In 1990 numerous cooperation projects between higher education institutions in the Federal Republic of Germany and the former GDR were launched with funds provided by the Federal Minister of Education and Science. Several of these projects concern environmental protection issues:

- Fachhochschule Weihenstephan, Chair of Brewery Technology/Berlin University, Dipoldis Valde FH and collective brewery combines in the former GDR: technological seminar on brewery technology and environmental protection.
- Fachhochschule Weihenstephan, Chair of Agricultural Economics/Halle University and the Agricultural College in Bernburg: concept for an exchange programme for the teaching of agroeconomic and agroecological knowledge.
- Bonn University, Institute of Urban Planning, Land Use System and Agricultural Engineering/different universities, in particular the Technical University Dresden: post-graduate course in "Administration of Real Property and Environmental Planning" as well as the preparatory work for joint study programmes for the subjects of land use and soil management and relevant research projects.

- Dortmund University, Department of Chemical Engineering/ "Carl Schorrlämmer" Technical University at Merseburg/Leuna: exchange of information, colloquia and seminars on "environmental protection and building technology".
- Rhineland-Palatinate College of Education/College of Education in Erfurt/Mülhausen and other higher education institutions: restructuring of teacher training, development of computer science, biology, ecology and education science.
- Flensburg Fachhochschule/Technical University Dresden: reciprocal periods of research and training within the framework of projects on energy technology/block cogenerative power stations.

IV. Environmental Education in Further Education and Guidance

1) Adult education centres (Volkshochschulen)

All the 900 adult education centres in the western part of the Federal Republic of Germany offer ecological courses. The main themes are energy and health, particularly with a view to individual scope for appropriate action on the part of participants at home, during leisure time and at work. Apart from computer courses, the highest rate of increase in adult education centres has been noted in ecology courses.

2) Environmental Centres

Environmental centres can, and are intended to, facilitate the provision of environmental education for young people not only in schools but also "on the spot", e.g. at a body of water or at a chimney where filters and measuring devices can be used. Kindergartens, schools, training firms and higher education institutions require sufficient scope and adequate funds for the implementation of project weeks, field trips, informatory tours of firms and entire days devoted to environmental education and the study of environmental protection issues as well as to the practical application of theoretical environmental knowledge. It would be desirable to have cooperative systems under which schools, firms, environmental centres, authorities, etc. would jointly ensure the provision of environmental education with the required impact and intensity in the respective region.

An environmental centre can be developed in different ways. It could be designed as a building for organizing seminars which, in a bird reserve, will provide school classes, youth groups or participants in further education seminars with first-hand information drawn from nature on the subjects of nature conservation and environmental protection. On the other hand it could be a documentation centre, which can be used by education institutions for providing information on nature conservation and environmental protection.

The purpose of environmental centres is to:

- intensify environment-related knowledge,
- provide both positive and negative first-hand experience in the natural, built-up and social environments,
- study and reflect on the current environmental situation and its development as well as on trends in the relations between human beings, social institutions and the natural environment,
- develop and present alternatives to counteract values, attitudes and patterns of behaviour which have been seen to be detrimental to the environment.

Examples of environmental centres:

Bird reserve station, nature conservation centre, urban ecology centre, energy centre, environmental education centre, academy of nature conservation.

A report presented by the Federal Environmental Protection Agency documents the work of more than 130 environmental centres. In addition, relevant information is provided by documentation compiled by the Study Group for Education on Nature and the Environment and by the World Wildlife Fund (1989, Pfeffersche Buchhandlung Kommissionsverlag, Bielefeld).

3) Projects by the Federal Minister of Education and Science in this area

a) **"Individual planning and working"** (German Adult Education Centres Association, Teaching Centre, 1984 to 1988): This project was concerned above all with leisure opportunities in the natural environment. It aimed to examine ecological issues such as landscape preservation, the restoration of old buildings, coverage of house roofs and façades with green plants, allotments, biological fertilizers,etc. and also included relevant practical instruction.

b) **"Course model and materials for information technology and everyday technology for adults"** (German Adult Education Centres Association, Teaching Centre 1985 to 1988): Wide sections of the population are to be enabled to handle technical products competently. This project is concerned with the relevance of environmental protection to everyday life so that initial anxieties in the face of technology and its utilization are eliminated and students are encouraged to adopt a responsible attitude towards new technological development.

c) **"Modification of behaviour as a result of further education"** (Katholische Bundesarbeitsgemeinschaft für Erwachsenen-bildung/Federal Catholics Study Group for Adult Education), 1986 to 1989): The project used a mixed media programme on "ecology in everyday life" to study those preconditions and circumstances which can bring about a change in attitude in further education participants. To this end ecological everyday situations present a good field for experiment, as a considerable number of target groups can be involved, for example, groups for the elderly, youth groups, women's groups, Bible study groups, etc. A project guide can be obtained from the Federal Catholics Study Group for Adult Education.

e) **"Mixed media further education and TV"** (German Adult Education Centres Association, Adolf-Grimme-Institut, 1984 to 1987): some typical mixed media projects were selected to establish the extent to which TV programmes and materials produced as part of an earlier project can be adapted and updated using more recent productions. Specific programmes were chosen to see how these tasks can be carried out.

f) **"Distance study course: ecological assistant"**
(Wirtschaftsakademie für Lehrer e.V. Bad Harzburg):
The Wirtschaftsakademie für Lehrer e.V. (Bad Harzburg) is currently carrying out a project – supported with funds provided by the Federal Minister of Education and Science and the Federal Institute for Employment – which is aimed at developing and implementing a correspondence course for the occupation of "ecological assistant". Unemployed university graduates are to be equipped with the knowledge and skills necessary to qualify as ecological assistants. In this profession the career prospects are excellent, which means that it can help reduce unemployment among graduates. 150 participants in the first pilot study course are currently being instructed in the basic principles and methods of modern environmental protection and of environment-conscious management within the framework of a correspondence study course by means of study letters and seminars. A further important feature of the study course is the introduction of participants to practical work, which is effected via close contacts with firms, associations, agricultural enterprises and regional authorities. This project is now also being implemented in the new German Länder.

g) **"Activity-based environmental learning within associations"**
(Heimvolkshochschule Haus Neuland e.V., Bielefeld):
Together with the Minister of the Environment, Regional Planning and Agriculture of Land North-Rhine-Westphalia, the Federal Ministry of Education and Science is promoting within the framework of this project the development of a regional ecological learning centre located in a residential adult education centre. The aim is to interest members of the associations in becoming new participants in environmental further education programmes on the one hand and, on the other hand, to use associations for the organization of ecological further education programmes.

h) **"Home-related environmental advising – skilling courses for women homemakers"**
(Deutscher Hausfrauenbund e.V., Bonn, Bielefeld University – Department of Sociology):
The purpose of the project was to develop and test contents and methods designed to qualify women homemakers as environmental advisers in the domestic sector. Teaching materials for courses and further education events were ela-

borated for this group of participants. The project concluded with a conference in Bielefeld on 30 October 1990. A detailed final report can be obtained on request.

i) **"Market analysis for the evaluation and identification of the prospects for the publication of a periodical devoted to environmental education"** (the firm of Billig, Briefs and Partner, Cologne):
The aim of the study is to develop a concept for the publication of a periodical devoted to environmental education for different target groups. Those involved in the project have meanwhile presented an analysis of existing ecological and educational bodies. Concepts were presented for continuous environmental further education for different target groups, above all for teachers as well as for sections of the population whom it is difficult to interest in educational programmes.

j) **"Concept and design of an environmental manual as a tool of environmental education"** (Stiftung Öffentlichkeitsarbeit für die Wissenschaft e.V. Bonn):
Under this project an environmental manual was elaborated, which can be used as an instrument of environmental further education in different institutions (e.g. adult education centres, environmental centres, etc.). The manual treats different sectors of environmental protection on an interdisciplinary basis, presenting a high-standard scientific text in an easily comprehensible form. The book can now be purchased from booksellers.

k) **"Ecological education in sport"** (Deutsche Sportjugend, Frankfurt):
On the one hand, sports activities contribute to environmental pollution and on the other hand such activities are themselves adversely affected by existing environmental nuisances. Athletes have very little knowledge of these processes, with the result that it became necessary to elaborate a concept for the training and further education of environmental officers and multipliers involved in sports. The Deutsche Sportjugend has developed concepts designed to enhance environmental awareness and improve the attitude towards the environment among young athletes in particular. The concepts consider not only programmes for the training and further education of environmental officers and multipliers in the 70 federated associations constituting the Deutsche Sportjugend but also teaching materials for use in the instruction of sports training supervisors and leaders.

l) **"Ecology and ecotechnology in extra-curricular education for adolescents"**
(Learning initiative: Women design ecotechnology "Berlin 1989 – 1992):
The pilot scheme, which the Federal Ministry of Education and Science supports jointly with the EC and the Senate Administration for Women, Families and Youth in Berlin, tests the skilling of women staff members of extra-curricular education for adolescents in the sector of "renewable energies". On the basis of measures successfully introduced for the off-plant training of girls, learning modules are to be developed for the further education of the leaders of girls groups' activities, which will consider above all girls' access to scientific topics. The project is being carried out in cooperation with the EC and constitutes part of the IRIS programme.

m) **"Development and testing of a mobile environmental education facility"** (BUND Naturschutz in Bayern e.V., Kreisgruppe Deggendorf):
Under this project a mobile environmental education facility is to be developed and tested for operation in different institutions in the field of environmental education and environmental further education. The facility is intended not only to supplement institutional environmental education programmes but also to provide general environmental education for the public with a view to attracting new groups of participants. In this connection particular importance is attached to the idea of short-term educational programmes, e.g. with a view to equipping public facilities as centres of environmental education.

n) **"Implementation of the results of the Bundestag Study Commission on Preventive Measures to Protect the Earth's Atmosphere"** in environmental education (firm of t.i.p. GmbH, Bergisch-Gladbach):
Under this project recommendations were elaborated for the implementation of the results of the Bundestag Study Commission on "Preventive Measures to Protect the Earth's Atmosphere" in environmental education. Numerous proposals were presented by four working groups (general schools, vocational training, higher education and the scientific community, further education) concerning the integration of relevant topics and the development of suitable

methods. The results were published by Economica-Verlag. The book is available from booksellers under the title of "Schutz der Erdatmosphäre – eine Herausforderung an die Bildung" (Protecting the Earth's Atmosphere – a Challenge for the Educational Sector).

o) **Integration of environmental topics in adult education programmes"** (German Adult Education Centres Association, teaching centre, 1988 to 1991):
The project aims to develop and test learning units and learning materials designed to facilitate the treatment of environmental issues within the framework of the range of general educational programmes provided at adult education centres.

V. Environmental education in the new German Länder

Prior to the political turning-point in the former GDR the goals and contents of environmental education were set out in the curricula of government education institutions and in general programmes for kindergartens and general schools, in vocational training programmes, study curricula for training at Fachhochschulen and higher education institutions as well as at universities and in further education programmes at all levels of education. The programme on "Further Development of Environmental Education in the GDR up to 1985 and beyond up to 1990/2000", which evolved from the evaluation of the UNESCO Conference held in Tiflis in 1978, was considered a guiding principle and an orientation aid recommended by the "Advisory Council for Environmental Protection." Finally, within the framework of a national environmental conference held in March 1989 conclusions were developed for the further development of environmental education on the basis of the recommendation made by the UN General Assembly on the evaluation of the 1988 Brundtland Report. However, these conclusions were not confirmed as an official government programme, as had been originally envisaged. Likewise, a working group on environmental education, which had been appointed by the Advisory Council for Environmental Protection, was not confirmed by the GDR Council of Ministers, with the result that the activities were discontinued following the political turning– point.

Hardly any facts are available on the teaching of environmental education in the former GDR. It is, however, an established fact that lessons in gardening, which were provided on a one– hour-per-week-basis for grades 1-4 pupils attending the polytechnic secondary school, played an important role in environmental education in schools. As a rule, boys and girls worked in school gardens under the supervision of teachers, they planted vegetable gardens and profited from the proceeds by either consuming the vegetables themselves or selling them. Likewise, the rudiments of extra-curricula environmental behaviour were taught at the "Centres for Young Tourists" and the "Centres for Young Science Researchers and Technicians". The striking contradiction between the claim to provide environmental education in theory and the ecological reality in the former GDR must be evaluated just as clearly as the above-mentioned institutions which, even today, still constitute the subject of discussion as to their relevance for future environmental education in schools and in the new German Länder. That the ambitious environmental education goals were, after all, no more than written intentions which never got off the ground is proved not only by the fact that, up to 1989, the opposition crystallized in environmental groups among others. It is also proved by the knowledge available today on the environmental situation in the new German Länder. In their efforts to do justice to the claim to provide environmental education, teachers quickly found themselves at loggerheads with head teachers and school inspectors as well as with the Party and the administration.

Following the political turning-point, new concepts for environmental education were hammered out at the newly established Ministry of Education and Science, within which the former Ministry of National Education, the Ministry of Higher Education Institutions and Technical Schools as well as the State Secretariat for Vocational Training were amalgamated. For example, a course was designed on "indigenous animals and plants" for grades 7 and 8. A course on "environment and environmental planning on home ground" as well as a course on "materials and energy conversion in nature and technology" – were designed for grades 9 and 10. In a new division specially set up to deal with "Environmental education, accident and disaster protection", a detailed "concept for the provision of environmental education and of disaster protection training in the education system" was developed. It is noticeable that all papers continued to apply a "top-down" approach. The link between the central authorities of the former GDR, which were in the process of dissolution, and the creative and enterprising basis – above all in schools – was not intact. This is why the papers presented by schools, although extremely detailed, were barely relevant, because hardly any of them had been put into practice. None the less, the school papers are distinguished by the obvious awareness of practical requirements on the part of the authors and their value is therefore such that they would merit discussion also in the future. Like the comparable drafts elaborated for different study courses, the draft concepts for the provision of environmental education and disaster protection training focus too much on the aspect of remedial environmental protection.

Since, on the whole, it is currently just as difficult to assess the provision of environmental education in the new German Länder as it is to assess the outlook and initiatives on the part of teachers, the Federal Ministry of Education and Science has requested the German Association for Environmental Education to cooperate with IPN in carrying out a study for the school sector. Like the ongoing recurrent survey on "The practical provision of environmental education in the Federal Republic of Germany", the said study will investigate the situation and future for environmental education in the new Ger-

man Länder. There are plans to complete similar studies for other sectors of education. Above and beyond this partnerships between schools and higher education institutions, e.g. in cooperation with ongoing pilot schemes (e.g. the "family/environment/health" project under way in Land Baden-Württemberg), are being used in efforts to incorporate the know-how acquired in the old Länder in practical work in schools in the new German Länder.

VI. Environmental education in international organizations

1) Following the UN Conference held in Stockholm in 1972 (On the Human Environment), UNESCO discussed for the first time a list of topics covered by environmental education in Tiflis, USSR, in 1977. A follow-up conference was held in Moscow in 1987. However, it was not until 1988 – inter alia at the European Regional Conference (MINEDEUROPE) – that it became clear that environmental education can have a crucially important function as a catalyst for environmental research and environmental protection activities. This was, among other things, established in the recommendations of MINEDEUROPE 1988 (according to which the Member States are to encourage research and development in the environmental sector, to incorporate relevant research findings in environmental education and intensify their commitment in cooperative actions such as the UNESCO model school network). Under the UNESCO intergovernmental programme on "Man and the Biosphere" the Federal Ministry of Education and Science, together with the Federal Ministry for the Environment, Nature Protection and Nuclear Safety and the Federal Ministry for Research and Technology as well as Land Lower Saxony and Land Schleswig-Holstein drew up a project on "Practice-related transfer of environmental research results to environmental education".

2) In the European Communities an EC school network has been created under the 2nd and 3rd EC Environmental Programmes. However, owing to a lack of dissemination to responsible mechanisms, the network no longer exists. It was possible to engage a number of schools in cooperation in ongoing pilot schemes set up by the Bund-Länder Commission. In this respect, active assistance was provided by a meeting of experts organized by the Federal Ministry of Education and Science in May 1988. The EC Council of Ministers' decision on environmental education of May 1988 likewise calls on all Member States to introduce appropriate measures for the dissemination and treatment of environmental issues in the education system. In February 1988 a Federal Ministry of Education and Science meeting of experts, carried out by the Institute for European Environmental Policy, prepared the ground for this decision. Deliberations on appropriate instruments, which, if necessary, could be funded by the EC, have not yet been concluded. An EC task force is currently studying how to implement the decision.

3) Together with the Organization for Economic Cooperation and Development (OECD) and a number of Länder in the Federal Republic of Germany, the Federal Ministry of Education and Science is conducting a project on "Environment and schools development". The Institute for Science Education at Kiel University has taken on the task of providing scientific advice during the first phase of the project, whereas Hanover University, together with the German Association for Environmental Education, is responsible for providing such advice during the second phase.

Chronology of Environmental Education

The following is a list of the conferences, decisions and programmes, etc. considered to have been instrumental in the promotion of environmental education in the Federal Republic of Germany.

1972 United Nations Conference on the Human Environment in Stockholm

1977 Intergovernmental Conference on Environmental Education of UNESCO in Tiflis (USSR), 24-26 October 1977

1978 Munich Conference on the Tasks of Environmental Education in collaboration with the German Commission for UNESCO, the Bavarian State Ministry for Regional Planning and the Environment, the Federal Ministry of the Interior and the Institute for Science Education in Kiel

1980 Statement by the Ministers of Education of the Länder on the Role of Schools in Environmental Education (17 October 1980)

1980 UNESCO Conference on Environmental Education in Essen (FRG)

1982 Status report of the Conference of Ministers of Education on "Environmental education in schools" (25 May 1982)

1986 Council Resolution on an action programme for the European Year of the Environment

1986 BMBW symposium "Environmental education – a task for the future", 24-26 September 1986

1986 Status report of the Conference of Ministers of Education (KMK) on "Environmental education in schools" adopted by the KMK on 11/12 December 1986

1987 "White Paper on Environmental Education" issued by the Federal Ministry of Education and Science

1987 Decision by the Bund-Länder Commission for Educational Planning and Research Promotion on a list of criteria for "The incorporation of environmental matters into the education system"

1987 UNESCO-UNEP Conference on Environmental Education in Moscow (ten years after Tiflis)

1988 Decision by the Central Committee of BIBB on environmental education (4/5 February 1988)

1988 International Conference on "Environmetnal education – a task for European education policy" in Dortmund, 22-24 February 1988

1988 Resolution of the EC Council on environmental education, 24 May 1988

1990 Law on the establishment of the "Deutsche Bundesstiftung Umwelt" (German federal environmental foundation) of 18 July 1990

1990 Public presentation of the project "Protecting the Earth's Atmosphere – a challenge for the educational sector" by the Federal Ministry of Education and Science, 24 September 1990

Publications on Environmental Education

BMBW (including publications from BMBW projects)

Dokumentation des Symposiums "Zukunftsausgabe Umweltbildung" vom September 1986 (Reihe "Grundlagen Perspektiven Bildung Wissenschaft, Band 16).

Deutscher Forschungsdienst Digest Sonderausgabe 1/1988 "Aufgabe Umweltbildung".

"Umweltbildung in der EG": Auswertung einer EURYDICE-Umfrage und Dokumentation der Fachtagung "Umweltpolitik als bildungspolitische Aufgabe in Europa" vom Februar 1988 (Institut für Europäische Umweltpolitik, Bonn/London/Paris/Brüssel, (Reihe "Studien Bildung Wissenschaft", Band 79), März 1989, Bock Verlag, Bad Honnef.

"Umweltbezogene Bildungsangebote an Hochschulen ausgewählter Länder" (Institut für Europäische Umweltpolitik, Bonn/London/Paris/Brüssel, Reihe "Studien Bildung Wissenschaft", Band 80), Juli 1989, Bock Verlag, Bad Honnef.

"Modelle zur Umwelterziehung in der Bundesrepublik Deutschland" (Deutsche Gesellschaft für Umwelterziehung, in Zusammenarbeit mit dem KM Rheinland-Pfalz und dem Institut für die Pädagogik der Naturwissenschaften an der Universität Kiel, Dokumentation der Fachtagung vom Mai 1988).

"Umweltspezifische Berufsorientierung in allgemeinbildenden Schulen" (Otto-Blume-Institut für Sozialforschung und Gesellschaftspolitik e.V., Dokumentation der Fachtagung auf der 10. Europäischen Bildungsmesse Interschul im Februar 1988).

"Schulische und außerschulische Lernorte in der Umwelterziehung" (Deutsche Gesellschaft für Umwelterziehung, Kiel/Centro Europeo dell"Educazione, Frascati/Roma, Dokumentation der Fachtagung in der Villa Vigoni vom Februar 1989).

"Modelle zur Umwelterziehung in der Bundesrepublik Deutschland – Die Einrichtung fächerübergreifender lokaler Netze zur Umwelterziehung" (Deutsche Gesellschaft zur Umwelterziehung in Zusammenarbeit mit dem KM Niedersachsen und dem IPN Kiel, Dokumentation der Fachtagung vom Oktober 1989).

"Geschichten, die die Forschung schreibt – Ein Umweltlesebuch", 1990, Verlag Deutscher Forschungsdienst, Bonn.

"Schutz der Erdatmosphäre – eine Herausforderung an die Bildung" (Zur Umsetzung der Empfehlungen der Bundestags-Enquete-Kommission, Vorsorge zum Schutz der Erdatmosphäre – Ergebnisbericht) 1990, Economica-Verlag, Bonn.

UBA (Federal Environmental Protection Agency

Umwelterziehung in Schule und Erwachsenenbildung, 1980.

Bericht über die Entwicklung der Umwelterziehung in der Bundesrepublik Deutschland seit der UNESCO-Weltkonferenz über Umwelterziehung in Tiflis, 1980.

Ermittlung von Möglichkeiten zur Einbeziehung von Umweltthemen in das berufsbildende Schulwesen, 1980.

Materialien zum Thema: Berufe im Umweltschutz, 1985.

Ermittlung und Analyse von Einrichtungen außerschulischer Umwelterziehung, 1986.

Ökologie in der Erwachsenenbildung, 1986.

Umwelterziehung in Bund und Ländern, 1987.

Umwelterziehung im Vorschulbereich, 1988.

Studienführer Umweltschutz, 1988 (4. Auflage) – 1977 (1. Auflage)

Internationaler Aktionsplan für Umwelterziehung in den 90er Jahren. Ergebnisse des internationalen UNESCO-UNEP-Kongresses über Umwelterziehung (Moskau 1987), 1988.

The Umweltbundesamt also published several collections of teaching materials and information on suitable teaching methods:

Unterrichtsmaterialien Ökologie/Umweltschutz für den Sozialkundeunterricht an berufsbildenden Schulen.

Lehrerhandreichung Ökologie und Umweltschutz für das Berufsfeld Agrarwirtschaft im Berufsgrundschuljahr.

Lehrerhandreichung Umweltschutz für das Berufsfeld Chemie, Physik und Biologie.

Lehrerhandreichung Ökologisches Bauen für das Berufsfeld Bautechnik.

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